Handprints for Change

A Teacher Education Handbook

Activating Handprint Learning Actions in Primary Schools and Beyond

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By
Kartikeya V. Sarabhai, Christa Henze, Robert O´ Donoghue,
Juan Carlos A. Sandoval-Rivera, Chong Shimray

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Project Coordination:	Kartikeya V. Sarabhai, Preeti R. Kanaujia, Meena AS
Authors:	Kartikeya V. Sarabhai, Christa Henze, Robert O´ Donoghue, Juan Carlos A. Sandoval-Rivera, Chong Shimray
Editor:	Jim Taylor
Comments and Contribution:	Atussa Ziai, Madhavi Joshi, Prithi Nambiar
Compilation and Preparation:	Aishwarya Balasubramanian, Preeti R. Kanaujia, Meena A.S., Kim Ward, Padma G.
Design and Layout:	Hitesh Vaza
Illustrations:	Rob O´ Donoghue and John Bertram, Daina Martin
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Centre for Environment Education (CEE), Thaltej Tekra, Ahmedabad 380054, India
Website: https://www.ceeindia.org/; Contact email: handprint@ceeindia.org

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Handbook Authors

Kartikeya V. Sarabhai holds Tripos in Natural Science from Cambridge University, UK and did post-Graduation work in Development Communications from the Massachusetts Institute of Technology (MIT), USA. As one of the world's leading environmental educators, he has contributed immensely in the field of Education for Sustainable Development (ESD) involved closely with UNESCO, UNEP and other UN bodies and Conventions. He is the editor-in-chief of the Journal on Education for Sustainable Development (JESD). Mr. Sarabhai has been recognized globally for his pioneering work in EE and ESD with several national and international awards, including the International "*Brandwein Medal*", the "*Tree of Learning"award, "Sir C.V. Raman Memorial Award"* and the "*Padma Shri"* one of India's highest civilian awards.

Christa Henze works as a researcher at the University of Duisburg-Essen, Germany. Her research activities and teaching focus on various issues in the context of Education for Sustainable Development (ESD). She deals with questions of the educational concept of ESD as well as questions of target group-oriented sustainability communication and the implementation of sustainability-oriented educational activities in various educational institutions (universities, schools, extracurricular educational institutions). Sustainability-related focal points include biodiversity and ESD as well as climate change and ESD.

Christa Henze is involved in various networks and activities at national, European and international level. Here are two examples: Together with many colleagues from her university, she is actively involved in the European university network AURORA - an intensive cooperation with nine partner universities from Reykjavik to Naples for the implementation of the 17 SDGs. Since 2009, she has been an active member of the ESD Expert Net, aninternational network of education experts from India, Mexico, South Africa and Germany, developing transnational approaches and strategies for education for sustainable development.

Since September 2022, she has been working as the Equal Opportunities Officer at the University of Duisburg-Essen; her objectives include a much stronger link between gender equality issues and the Sustainable Development Goals, including the formation of corresponding networks.

Handbook Authors

Rob O'Donoghue is Professor Emeritus at the Environmental Learning Research Centre (ELRC), Rhodes University. In his Handprint CARE work on environment and sustainability education, he has given close attention to heritage knowledge practices in deliberative learning actions within post-colonial curriculum and community contexts. Recent work on ethics-led transformative learning has been undertaken within the ELRC T-Learning research with the ISSC and in interactions on handprint pedagogy for ESD with colleagues in Mexico, Germany, India, Norway, Malaysia and Japan.

Juan Carlos A. Sandoval-Rivera is a full-time researcher at the Instituto de Investigaciones en Educación, Universidad Veracruzana, Mexico. Through audio-visual, collaborative research methodologies and qualitative research, Juan Carlos researches and supervises educational research projects on education and indigenous knowledge in socio-ecological processes of adaptation to socioecological challenges in indigenous and rural contexts. His current project is "Towards a new pertinence and relevance of rural and indigenous education: situated learning for sustainability based on narratives, concerns, knowledge and practices and its articulation to the national curriculum".

Chong Shimray is Associate Professor in the Department of Education in Science and Mathematics at the National Council of Educational Research and Training (NCERT), New Delhi, where she is associated with various tasks related to school education in India. Her most notable contributions are reflected in the area of environmental education where she coordinates projects and programmes undertaken by NCERT. As part of her Fulbright-Nehru Fellowships in the United States and Chevening Fellowship at the University of Oxford, UK, Chong focussed in the area of environmental and climate change education. Her book titled “Teaching Environmental Education: Trends and Practices in India” was published by SAGE Publishing in 2016.

Foreword

In a globalised world, our actions have a direct impact on not only on those near but on people in other parts of the world and future generations. Be it the threat of climate change, the widening gap between rich and poor, malnutrition, displacement, the loss of biodiversity or social conflict: we cannot understand the challenges of our time without being aware of the complex interplay between ecological, social and economic factors. Nor can these global challenges be overcome without a humanity that lives sustainably and responsibly. If we are to create the conditions for a dignified future worth living, we must be able to assess how our actions today affect our living conditions tomorrow and act accordingly. Education for Sustainable Development (ESD) builds the necessary knowledge and skills to achieve this.

For this reason, education is not only a stand-alone goal in the Agenda 2030, agreed upon by the United Nations, but also considered a key enabler to reach all other Sustainable Development Goals (SDGs). The Agenda 2030 also emphasises the importance of global partnerships for sustainable development to overcome the big challenges we face worldwide. More specifically, it calls for the creation of multi-stakeholder partnerships to achieve the SDGs. The ESD Expert Net is such a global multi-stakeholder partnership in the area of education.

Engagement Global has been supporting the ESD Expert Net on behalf of the German Federal Ministry of Economic Cooperation and Development for more than a decade. With its vision to anchor ESD in all areas of formal education, the global network has developed various education programmes and materials. A key quality of these "products" is to bring multiple perspectives together – from different countries as well as from different stakeholders, thereby reflecting an important principle of ESD and providing practical tools to "think global and act local".

In the same spirit, this international teacher education handbook offers a rich resource for how to put ESD into practice in the classroom. It offers a pedagogy allowing teachers to integrate ESD into their daily teaching practice and it provides a variety of exemplars, videos, pictures and other materials to help them realise this step. Because of its global nature, the handbook primarily supports its readers in getting ideas, which then can be adapted to specific local contexts. In other words, the handbook is meant as a first impulse for a wider series of materials informing the global community of ESD practitioners. The Handprint website welcomes you to become part of the movement. Join in and share your experiences. Together we can make "a new social contract for education" (UNESCO 2021) come alive.

- ***Engagement Global***

Preface

"We need pedagogies that help us to learn in and with the world and improve it."

Reimagining our future together - A new social contract for education, UNESCO Report 2021

The ESD Expert Net was formed in 2010 at the behest of the Federal Ministry for Economic Cooperation and Development, Germany. Ever since, the global multi-stakeholder partnership has brought together experts from India, Mexico, South Africa and Germany representing universities, governmental and non-governmental organisations to foster collaboration on Education for Sustainable Development (ESD). In a joint effort, innovative programmes and education resources have been developed for educators, multipliers and trainers to build capacities and get ESD on the ground.

Through the ESD Expert Net, we as a team drawn from five institutions - Rhodes University (South Africa), Universidad Veracruzana (México), Universität Duisburg Essen (Germany), National Council of Educational Research and Training (NCERT, India) and Centre for Environment Education (CEE, India) - have worked on our collective experiences to develop a pedagogy that carries the spirit of the "new social contract for education" (UNESCO), the Sustainable Development Goals (SDGs) and the learnings and experiences from the work during the UN Decade on Education for Sustainable (ESD). Initial ideas for the pedagogy emerged through a series of ESD workshops conducted as part of a collaboration project within the ESD Expert Net. The work on Handprint CARE builds on, is interlinked with and complements other educational materials that have been developed by the ESD Expert Net, such as the Training of Trainers, Cashew – A Global Learning Challenge, Teaching the SDGs or Ten Steps towards Systems Thinking.

The Handbook was developed during the Covid-19 pandemic when travelling and face-to-face meetings were not possible. The authors and the team met online every week to discuss and share their thoughts, experiences and learning around using the Handprint CARE pedagogy in schools. During this time, we experienced how the COVID-19 pandemic has disrupted education systems globally, affecting vulnerable learners the most. At the same time, it had usefully necessitated a careful look at how school education systems work in each of the partner countries as well as common challenges and shared opportunities to support ESD in subject teaching with a focus on ethics-led learning.

Conceptually, Handprint CARE draws on the Handprint approach initiated by 10 years old students in Holy Mary School in Hyderabad and taken to scale by CEE as well as the CARE approach elaborated by Sami members of a Norwegian research group. As

discussed in Reimagining our Future Together, “the future will present students with novel problems and opportunities. Awareness that the world will continue to change can be built into curricula and pedagogy by intentionally cultivating learners' capacities for problem-recognition and problem solving. Problem-posing education engages students in projects, initiatives and activities that require discovery and collaboration. Facing clear goals and objectives, students must transcend disciplinary boundaries to find viable and imaginative solutions.” This approach is reflected in the Handprint CARE pedagogy. There is a strong emphasis on learners discussing ethics in relationship to their Handprint actions.

Through this Handbook, we share the Handprint CARE pedagogy as an open-ended schema for mediating better-situated and ethics-led action learning in school subject disciplines. We have developed this keeping primary education system in mind; however, we feel that the approach lends itself to be modified for use in higher grades. It is developed and presented as an international generic version, which would need to be adapted for different countries and educational systems. The Handbook is meant for teacher educators and more educational resources like short videos, exemplars and picture stories done in Kamishibai available on the website www.handprint.in.

Being an international version, it was important to develop the pedagogy keeping different educational systems in mind. We have worked together on this handbook to not only develop this educational resource but also to find ways to use it in each of our countries to promote Handprint action – inspiring learning and action together towards the more just and sustainable world we all strive for.

We plan to pilot this methodology in schools in the four countries where we work but would like as many others to try this pedagogy and give us feedback.

Contents

INTRODUCTION AND OVERVIEW

“The destruction of Earth's environment is the human rights challenge of our times.”
Desmond Tutu

As inequalities and pressure on the Earth's resources grow, the Handprint imperative is all about taking action for sustainability, no matter how small and local the action may be. Furthermore, as we teach, learn and act for social justice and sustainability, we recognise how important teachers are in this work. Teachers are key for supporting positive, learner-led actions that can enable more just and sustainable futures.

This Teacher Education Handbook is intended as a resource for course-supported teacher professional development in primary education settings (age group 6 –13 years). The organisation of primary schools offers many opportunities for Education for Sustainable Development (ESD). Since teaching and learning processes take place in a number of different subjects, teachers are encouraged to work together in a holistic way. In particular, it is worth noting that at this level natural and social sciences are usually taught in an integrated way.

ESD is often approached as an expansion of quality teaching and learning where participants come to recognise concerns through deliberative learning which enables them to assess value and to act together for more just and sustainable futures (KMK, BMZ & Engagement Global (Ed.), 2016, p. 91). In a way, this handbook is a synthesis of practical actions for sustainability. It includes ideas for ethics-led learning, story-sharing and intergenerational strengthening of humanity; it is about expanding curriculum pedagogy; it links with and mobilises the (Sustainable Development Goals) SDGs; it addresses and strengthens competences; and through action learning, it expands conventional assessment as well as lesson and change project planning.

All readers of this handbook are invited to join us, and, by working together with Handprints, help make the world a better and more sustainable place. This resource should not be limited to primary education settings. Many of us are finding it useful for senior schools, for teacher education and as a source-resource for postgraduate, co-engaged research.

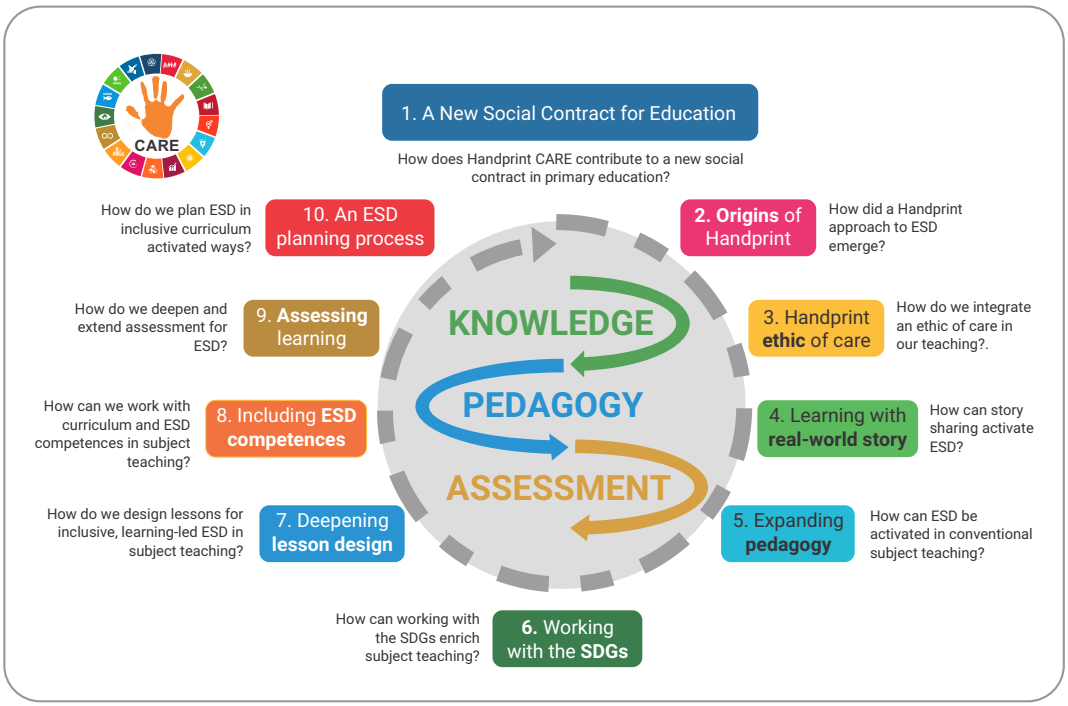

Figure 1: An overview of the 10 chapters with leading questions

The handbook has three parts:

Part One has ten chapters developed around questions which are likely to be asked by teachers on ESD in their subject teaching in primary education settings (see Figure 1). The ten chapters can be read in any order or studied in sequence as a teacher education programme. Each chapter is introduced with a leading question to help readers engage with the text, to explore key aspects of ESD in their teaching, to help teachers and guide their deliberative learning. In this way teachers can clarify and plan how to mediate ESD as evaluative learning around local matters of concern and towards Handprint learning actions that will contribute to future sustainability.

Part Two contains a selection of exemplars for environment and sustainability topics. The level of the exemplars provided is appropriate for the age group 6-13 years but can be adapted for use with other grades by creative teachers. All the materials are intended to provide illustrative starting points; they are not 'completely finished'. Most have been developed around real-world start-up stories that invite learners to share their own stories and experiences and to raise questions for learner-led inquiry, evaluative deliberation and action.

Part Three explores picture sequences as starting points for students to narrate stories that 'show us the way' to more just, positive and hopeful futures. Japanese Kamishibai paper theatre inspired Gcina Mhlophe, the famous African storyteller, to note how start-up stories can motivate students to write their own stories that can 'point the way' (umkomba ndlela). In this way, learners re-imagine and re-write how they can live together better in a changing world. Similarly, emancipatory stories in Mexico and story-telling traditions in India inspire positive, ethics-led learning and change.

How to use this Handbook?

The handbook has been developed to support teacher educators to train and guide teachers in introducing ESD in school subject teaching. There are two sections where the first part is chapters and second part is exemplars, however it is not required to follow any sequence while using or referring to this handbook. This has been developed keeping in mind that teachers can use this as open resources, which can be easily adapted, based on the local and specific school subject requirement. Teacher educators can use the handbook to develop their own ESD teacher-training module using the Handprint CARE approach. Along with this handbook, a set of online resources have also been developed to provide educators and teachers access to more reading materials to use and adapt to their own needs and context.

About Handprint CARE Web Resources

The web resources developed along with this handbook help teacher educators and teachers access a wide variety of useful resources on various themes and concepts. These educational resources are developed for teacher educators and teacher trainers, which could be used in conducting training of primary and upper primary pre-service or in service teachers on ESD. Some of the educational resources could be used directly by teachers for using the Handprint CARE approach in teaching and learning process.

The resources on the website **www.handprint.in** includes:

- Powerpoint presentations on introducing ESD using Handprint CARE approach
- Thematic Exemplars for reference

- Thumbnails for reference
- Sample lesson plans and storytelling teaching learning technique through pictures
- Video references for using as a teaching tool during training
- Educational Resources and publications developed by partner organizations

What is Handprint CARE?

A human impact or a 'Footprint' approach to ESD developed as a way of documenting and educating to address the impact of humanity on the planet. As a response to this evidence of risk, a 'Handprint' approach became centred on positive actions that social groups and anyone can take to make the world a better place: “Handprints are changes to environmental and social impacts that we cause outside of our footprints” (Norris, 2018). When linked to **CARE**, a Handprint approach offers **C**oncern for others, being **A**ttentive to needs, **R**espect for all and an **E**ngagement with matters of concern related to sustainability.

A Handprint approach developed as a more inclusive and solution-orientated approach to ESD. Most significant is how this practical work with teachers in resolving many of the limitations of earlier top-down approaches to ESD. These insights came to us in many countries of the Global South as a legacy of instrumental approaches to education. It is notable how this ESD work is developing as a new social contract for education (see Chapter 1).

In this handbook the following concepts and terms are used to describe a Handprint CARE approach to teaching and learning:

- Deliberative (dialogue and co-engagement; groups of diverse individuals exchange and weigh ideas and opinions about a particular issue)
- Knowledge-led (progressive understanding is a process of coming to know things together)
- Situated (insights located in the reality of our lives; situated learning has developed as an alternative to instructional learning approaches)
- Ethics-led and action-orientated learning (learning through and out of action including the need to engage cognitively and emotionally and the ability to translate knowledge into action)

- Transformative learning “routine problem solving approaches fall short of what is needed for transitioning towards a more sustainable world”; instead such transitions require a more systemic way of thinking, having in mind that our world is one of continuous change and that we need to “transform a world of contradictions, paradoxes, uncertainty, and unfairness” - Lotz-Sisitka et al., 2015, p. 75.

These approaches are supported by a wide range of current theory that is referenced in each chapter.

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Part I

Chapters as learner-led resources for ESD in school subject teaching

Introduction

An overview of how each chapter informs a Handprint CARE approach
A Handprint CARE approach to subject teaching involves more than simply selecting and undertaking Handprint actions for sustainability. It can unfold as a transformative re-alignment in school subject teaching. Rather than adding even more content into an already overcrowded curriculum, subtle re-alignments involve working more strategically with subject knowledge and ensuring that sustainability practices are foregrounded. As the realignment is activated in positive learning actions, it becomes possible to re-imagine our futures together and develop **a new social contract for education** (UNESCO, 2021) (see Chapter 1 – A New Social Contract for Education).

A Handprint approach is developed as a co-engaged process of **action learning and as an expansion of conventional teaching practices** to strengthen ESD. This was inspired by the spontaneous ethics-led and action-orientated responses of young learners working individually and together to make things better in the world around them (see Chapter 2 – Origins of Handprint).

To support learning-led and action-orientated engagement, participating teachers expanded conventional pedagogy to include both knowledge acquisition and participatory action learning. Here collaborative work with teachers uncovered how **cultural heritage** and **local matters of concern can be taken up within school subjects to enhance relevance and learning that relates to the everyday life of the children.** Handprint CARE has thus developed as a **platform for ethics-led learning actions in school subject teaching** (see Chapter 3 – A Handprint Ethics of Care in Subject Teaching).

An ethics-led approach became centred on the inclusion of local **cultures and action learning in primary education subject teaching settings.** Here teachers explore how **real-world[1] true stories** are a useful way to start up story-sharing in subject teaching by students. Story sharing enables students to begin to acquire

[1]*'Real-world' is used alongside 'real-life' to point to how learning engages both the physical realities in the world around us and the life experiences of students. This repositions knowledge acquisition as a real-world (onto-epistemic) activity where learning is culturally situated (life-experience) and thus both concept-dependent and activity-dependent (see Chapter 7 for an expansion of this critical realist perspective).*

relevant knowledge in real-life situations as they participate in collaborative action learning for social justice and future sustainability (see Chapter 4 – Learning with Real-World Stories).

We all learn how a Handprint CARE approach could support us to teach school subject knowledge in ways that support our students to engage in current matters of concern. It further enables us to evaluate unsustainable cultural practices and to deliberate and explore alternatives. The Handprint CARE materials and methods in the handbook also support **a practical expansion of conventional Teach-Task-Assess approaches** (see Chapter 5 – Expanding Subject Pedagogy for ESD).

The materials in this Handbook are also intended to provide adaptable starting points **for activating positive learning actions** in work with the SDGs (see Chapter 6 – Working with the SDGs) so as to develop ESD competences (see Chapter 8 – Including ESD Competences)

Conventional subject teaching that can be extended to include indepth inquiry to explore how sustainability concerns emerged, has been found to invite **inclusion, resonance-seeking inquiry and real-world action learning** in school subject settings (see Chapter 7 – Deepening Lesson Design for Transformative Learning).

Finally, the handbook provides a practical overview on continuous and summative assessment schema (see Chapter 9 – Assessing Learning) and concludes with some ideas on co-engaged programme planning (see Chapter 10 – ESD Programme Planning).

In Handprint CARE, ESD is approached as a culturally situated and ethics-led social learning process, towards:

Learning to look after others
to best care for each other and
to explore change projects
to improve the surroundings that we all share

Chapter 1

A NEW SOCIAL CONTRACT FOR EDUCATION

How does Handprint CARE contribute to a new social contract in primary education?

This Teacher Education Handbook is developed to inform a Handprint CARE approach to ESD in primary education settings. The formative research on this approach was undertaken through a series of collaborative initiatives with teachers and teacher educators (O'Donoghue, Misser & Snow, 2021). This deliberative research helped clarify a transformative re-alignment of teaching and learning towards a more culturally situated, inclusive and action-oriented approach to subject teaching. The intention was to develop a practical guide to key pedagogical transformations for inclusion of ESD in classroom teaching. This involves subtle but significant expansions in conventional school subject teaching towards an action learning approach.

Clarifying a new social contract for **Re-imagining our futures together** (UNESCO 2021)

"Two vital processes underpin education:

- *the **acquisition of knowledge** as part of the common heritage of humanity,*
- *the collective **creation of new knowledge** and new possible futures."*

(UNESCO,2021p.149)

- **Pedagogy needs to be expanded** around an ethic of ***cooperation and solidarity.***
- Pedagogy must foster empathy and compassion in work together to transform ourselves and our world.
- Learning develops through ***co-engaged relationships between teachers, students, and available knowledge.***
- Learning extends student relationships and an ***ethic of care and shared responsibility*** within a common world.
- Pedagogy activates ***transformative learning encounters*** around realities that exist and can be built together. (p.147)

Figure 2: Important pedagogical dimensions for a new social contract for education (Adapted, UNESCO 2021)

Such an action-learning expansion in subject teaching has many of the key features of a new social contract for education as proposed by UNESCO (2021). This social contract is centred on knowledge-led action learning. The questions reflected in Figure 2 signify key pedagogical processes outlined by UNESCO for ESD as a learning journey towards:

Co-operation and solidarity that reflects empathy and compassion within co-engaged learning relations between teachers, students and knowledge that activates an ethic of care and shared responsibility developing into a transformative learning encounter towards a more just and sustainable future.

In our work, we noted how classroom teachers could activate key steps towards a new social contract as a transformative re-alignment of education from within. In exploring how better education might be achieved, we realised that we do not necessarily have to scale back the curriculum but rather need to work towards more engaged and action-orientated learning. This reorientation is reflected in how:

A Handprint CARE approach can be realised (Chapter 2)
In ethics-led collaborative learning (Chapter 3)
Activated through real-world, true stories (Chapter 4)
with an expansion of subject pedagogy (Chapter 5)
using the SDGs for informing learner-led, action learning (Chapter 6)
through knowledge acquisition for participatory learning (Chapter 7)
towards the development of ESD competences (Chapter 8)
for evaluative learning and assessment (Chapter 9)
towards planning together to live more just and sustainable lifestyles (Chapter 10).

An Action Learning Approach to ESD

Active learning is generated in learning environments where institution-wide approaches (Whole School – Whole Institution) and preferably community-wide approaches (School in Community) are used. In this Handbook, the active learning perspective which was proposed by O'Donoghue et al. (2018) is followed, which points out that in active learning, critical perspectives on knowledge and their use in the local context must be generated through participation from a situated perspective. A key aspect here is not only participatory learning as a reflective social process, but also the centrality of the learner's reflective agency. Students' action includes the ability to develop skills to use their knowledge to generate change, in collaboration with other people who are interested in bringing the change.

Handprint CARE materials are public domain resources that are well suited for use in a wide range of teacher education and teacher networks that are active globally. Many of these are taking up work to clarify the attributes of a new social contract for education. We would encourage users of this Handprint CARE resource to join and contribute to this change through a wide range of transformative learning networks that are informed by key concepts like:

- Education for Sustainable Development (ESD)
- Sustainability Education
- Global Citizenship Education for Sustainability (GC4ESD)
- Global Learning
- Environment and Sustainability Education (ESE).

All these bring unique perspectives to a Handprint CARE approach in primary education. We have primarily explored the inclusion of ESD as a transformative learning imperative. This informs learning-led processes of change in school-in-community initiatives. An expanded approach develops the agency of young learners working together for the common good.

Concluding Insights

UNESCO (2021) has proposed a new social contract for education which is centred on knowledge-led action learning. Key pedagogical processes outlined by UNESCO for ESD include co-operation, compassion, an ethic of care and shared responsibility in transformative learning encounters towards more just and sustainable futures. This Handprint CARE resource can help teachers to work with ESD to contribute to the change proposed through this contract.

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Chapter 2

ORIGINS OF HANDPRINT

How did a Handprint approach to ESD emerge?

We live in challenging times. Human activities are fast disrupting the life-support systems that make healthy living possible. The air we breathe, the water we drink and the food we eat are all increasingly at risk. The concept of a Footprint is the measure of this risk and the negative impact in terms of emissions and resource consumption. To engage students in minimising their footprints, a learner-centred, action-oriented and transformative pedagogy is required. To empower students to take action in their immediate/local environment, as a part of their daily lives, thus becomes significant. This is especially the case in distinguishing action from behaviour, and focussing more on critical thinking for transformative learning, with teachers acting as facilitators of student learning.

The concern for positive action-taking led to an emergence of the concept of Handprint in India. This developed in an environmental education school programme run by the Centre for Environment Education (CEE). A Handprint symbolises action for sustainability and is a measure of ESD action that we can do individually, and collectively, to restore the balance between consumption and the planet's carrying capacity. It therefore indicates a caring attitude and a helping hand for the planet and all life on it.

Handprint was launched in 2007 at UNESCO's 4th International Conference on Environmental Education held in Ahmedabad, India. The Ahmedabad Declaration (CEE, 2007) from the conference states:

Our vision is a world in which our work and lifestyles contribute to the well-being of all life on Earth.

Handprints for Sustainability

Handprint has its roots in the imperative of a 10-year old student named Srija who offered her handprint as a commitment to action for sustainability. Her handprint and the inspiring imperative to undertake positive learning actions became a symbol for an international network of learner-led ESD programmes. These positive actions were supported by CEE across India, initially, and then through an active community of practice across the globe. Handprint action towards sustainability later became prominent in South Africa, Mexico, Germany and other parts of the world. Young learners from different parts of the world have adopted the Handprint concept and are transforming their lives and practices by doing something positive for change. As positive actions, Handprints offer a chance to contribute towards sustainability.

The ESD Expert Net members adopted the Handprint concept combining it with ESD and the CARE concept. Inspired by Srija and similar sentiments expressed by young learners elsewhere, the concept of ESD as ethics-led action learning shaped Handprint CARE as a process of learning to look after others to best care for ourselves and the surroundings we all share.

By engaging with Handprints for Sustainability thousands of people around the world are transforming their lives and practices by doing something positive for change. As positive actions, Handprint offer us a chance to contribute towards sustainability. Complementing Handprint with an ethic of CARE for others, results in a powerful framework steeped in kindness, consideration for others and enthusiasm for sustainability. In other words, it becomes a pathway to a just transition for all.

Towards a Handprint CARE approach

The inspiration that shaped 'C.A.R.E' came from Alta, Norway, from Sami members of a Local Culture for Understanding Mathematics and Science (LOCUMS) research group. The Sami noted that respect was the cornerstone of recovery from marginalising oppression. Sadly, the impacts of this period and some well-intended colonial tendencies, are still with us in modernity today. An evaluative and emancipatory imperative became the cornerstone of an emerging schema for the inclusion of ESD as an ethics-led learning process. This ethics-led process is more respectful of the teaching content of current school subject

disciplines and has an inclusive recognition of intergenerational knowledge practices within the diversity of cultural perspectives of Handprint CARE.

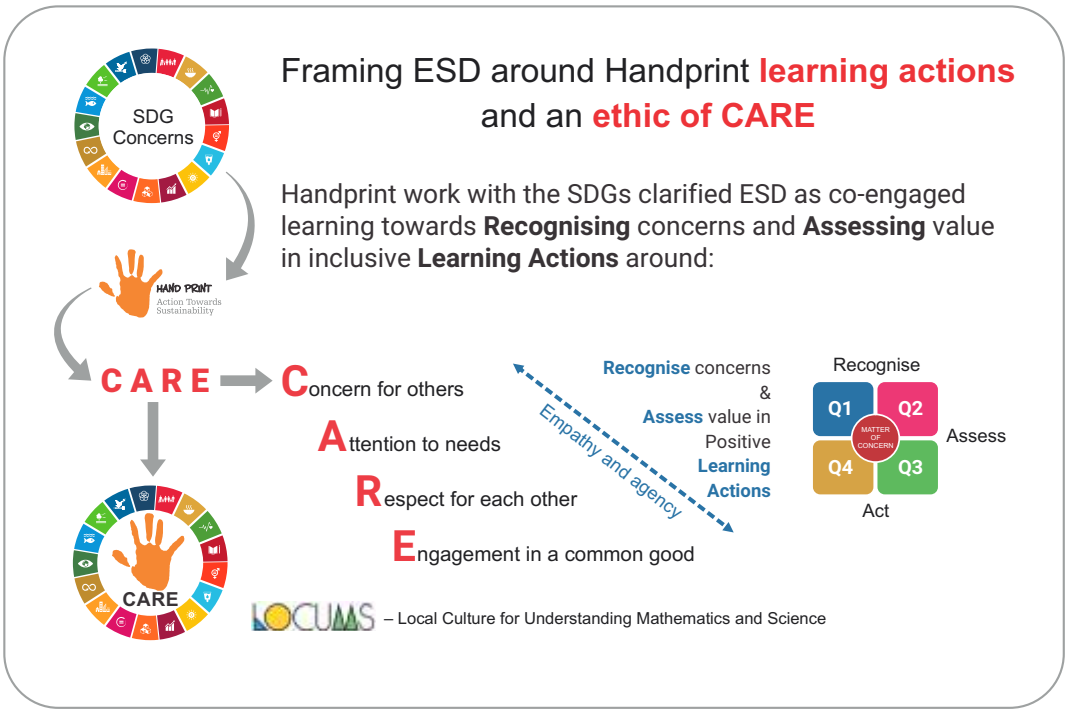

Figure 3: A schema for a Handprint ethic of care developed around the Sami notion of respect as an inclusive foundation for ESD

Figure 3 depicts how 'CARE' emerged as an acronym reflecting an ethic of inclusive respect through Concern for others, being Attentive to needs, showing Respect for each other and being Engaged in learning actions for the common good (CARE).

Handprint CARE can be characterised as a Handprint process of ethics-led learning actions built around respect and developing empathy for others. The SDGs also work well with this concept and are a useful and deliberative learning tool towards this common goal for humanity. Keeping this in mind, a Handprint CARE logo was developed which is culturally situated and follows historically informed approaches to ESD in the teaching of current subject disciplines (O'Donoghue et al, 2020).

Concluding Insights

The Handprint concept has emerged as a powerful methodology, which started in India and has inspired educators and practitioners across the globe. Young learners readily take up action learning initiatives for the common good in open-hearted ways. A school-in-community focus further activates and strengthens positive learning actions for future sustainability.

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Chapter 3

A HANDPRINT ETHICS OF CARE IN SUBJECT TEACHING

How do we integrate ethics of care in our teaching?

The term 'ethics' comes from the Greek word *ethos* which means habit or practice and is connected to values and virtues. Ethics asks what we should do in various types of situations, or what we should do as participants in different activities or professions – including tensions that can arise between persons discussing special questions and actions. Ethics are linked to our understanding of what is fair or just and which arise in our conscience as a sense of right and wrong in relation to being human. Thus, our actions and everyday life experiences are the subjects of ethics. This implies that, as humans, we have the capacity to think about our choices and so become responsible for our decisions and actions within the social and political framework in which we live.

Ethical values such as justice, truth, freedom, democracy, caring and solidarity are seen as fundamental values in many countries around the world and are documented in international declarations like the Earth Charter. The Earth Charter may be described as an ethical foundation for actions to build a more just, sustainable, and peaceful global society in the 21st century. It articulates a mindset of global interdependence and shared responsibility. The development of the Handprint CARE approach in India was also inspired by Gandhi's notion of 'truth-seeking experimentation' (1920) in which satya or truth has a wider sense than simply speaking truth; it encompasses truth in thought, speech and action.

Similar imperatives are embedded in cultural histories of other countries like *Ubuntu* in southern Africa, *Tapalewih* amongst the *Nahua* in Mexico and *Bildung* in the German discourse. An understanding of *Bildung* stresses the perspective of the subject shaping his or her learning process; it focuses on “individual reflexivity, individuality and long-term processes in building a global identity”, it emphasises “readiness for self-reflection and thus minimising the negative consequences of individual behaviour. Bildung reflects learning as an open process to an open future” (Scheunpflug, 2020, p. 44).

Ethics in the Classroom

Inclusion and empathy were considered key ideas for the ethical dimensions of Handprint CARE. Education philosopher Nel Noddings (2005; 2010) has demonstrated the significance of caring and relationships both as an educational goal and as a fundamental aspect of education. She has represented an ethic of empathy as both cognitive and emotional, which has been interpreted as knowledge-derived emotions and emotion-based knowledge. Following Noddings (2010, pp. 147-148), education from the CARE perspective has four key components: modeling, dialogue, practice and confirmation (see Figure 4). They are all activated within, and depend for their success on the setting up of caring relations:

- *Modeling is a crucial factor in almost every form of moral education pointing out that a child may choose a teacher as a moral model (consciously or unconsciously). According to Noddings (2010, p. 147), the "effects of modeling depend heavily on the relations of care and trust in which the modeling occurs". Teachers who know that it is likely that they will be taken as models have a special responsibility.*
- *Dialogue means more than mere conversation; it refers to teacher-student (learning) situations in which both parties speak, and both parties listen. For dialogue to be genuine, a caring relationship is essential.*
- *Practice refers, among other things, to learning environments in which teachers provide opportunities for their students to practise caring. Noddings (2010, p. 148) explained that for the teacher, it is not simply a matter of correcting uncaring behaviour; she/he also "takes note of kind and helpful behaviours and compliments the child who demonstrates care."*
- *Confirmation "points a person towards a better self". For example, the teacher engages in dialogue to help a student "see that his act did not measure up to his motives". Confirmation cannot be done by recipe; it would be "meaningless without the personal knowledge acquired in caring relations" (ibid., p. 148).*

Working with Noddings' dimensions enables us to understand how caring relations and the restoration of intergenerational[2] cultural capital could become a central feature for restoring cognitive justice in the knowledge sharing processes of ESD.

[2] *Intergenerational means including people from different generations – in short, young people working together with older people.*

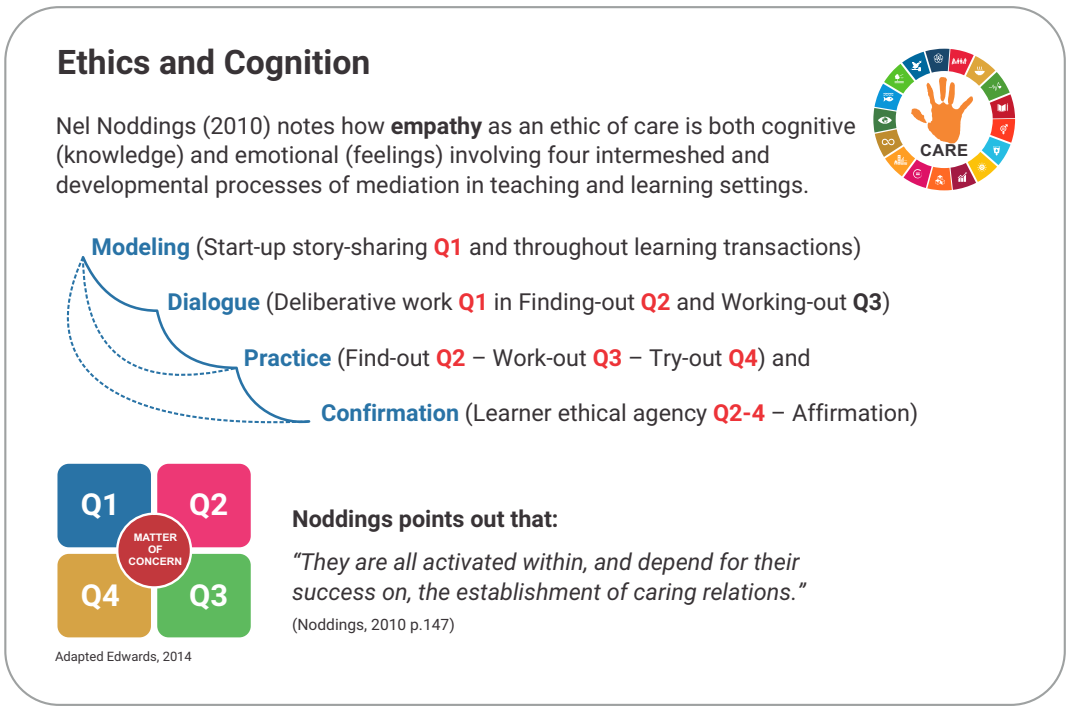

Figure 4: The inclusion of an ethic of care in classroom settings

Ethics-led learning seeks to promote participation, appreciation and communication as part of the learning process. The activation of ethics-led learning in relation to matters of concern required a shift from the common practice of presenting learners with problems to be solved, to engaging participants in subject knowledge and matters of concern using true, real-world start-up stories (see Chapter 4). Working with teachers on real-world issues helped us to explore how cultural, historical stories could lead to story sharing as a start-up process. It also led to understanding how emerging matters of concern could be investigated to overcome colonial legacies of oppression and the exclusion of intergenerational knowledge practices. These intergenerational practices often have important heritage knowledge value and can be an inspiration for developing better ways of doing things together.

The ethical disjuncture in Europe during the expansive period of globalising imperialism was shaped by a contested sense of superiority that played out in processes of colonial oppression and cultural marginalisation that spanned many centuries and are still manifest today in the Global South. Fortunately, education is being enacted through plural and emancipatory imperatives for restoring intergenerational foundations of sustainable development. An emerging view in

the Global South is that decoloniality “de-centers the West and affirms the re-emergences, re-existences and liberation of people formerly dominated by the global westernising project. In this way, education can secure and re-link with memories, modes of existence and legacies that people have reason to value but which have been destituted by modernity” (Menon et al., 2021, p. 939). Alongside the emancipatory dimension of ESD in the Global North, a Global South perspective points to how “decolonial pedagogy is a dialogic and a reflexive learning process, in which students reflect not only on colonial histories and geographies, but also their own personal biographies'' (ibid., p. 940).

Through adopting different perspectives and practising self-reflection, including critically reflecting on one's own values, ESD is, in principle, aiming to overcome subjugated ways of thinking. In the context of ESD as an emancipatory process, however, a key question for us has been: How can ethics be included in ESD learning tasks within school and cultural settings. To clarify the inclusion of ethics in ESD, O'Donoghue, Chikamori and Sandoval Rivera (2020) worked with a cultural historical schema for learning-led lesson task sequences as a four-stage process. They found that one can work with this Vygotskian schema as a practical framework for ethics-led action learning.

In this Handbook, action learning is thus framed as a four-stage progression. It is, however, open-ended and can be undertaken in any order. Anne Edwards (2014) used a Vygotskian schema to develop a four-quadrant model for deliberative action learning. This (see Figure 5) has been used to structure Handprint CARE materials around true Start-up Stories (Quadrant 1).

These stories can be used to present learners with matters of concern that enable them to raise questions which will take them into local depth-inquiry (Quadrant 2).

Empathy and concern commonly emerge in the learners at this stage. This helps them to clarify their formative ideas through mediated conversations that can be carried into deliberative modelling. From this they become able to design sustainable solutions for emerging concerns (Quadrant 3).

Finally, with the rising purpose and compassion, learners can explore and report on the change challenges they might undertake to resolve the matters of concern. All this is at the nexus of local concerns and their change challenges which are often engaged with as “change projects” (Quadrant 4).

Handprint ethics-led learning in subject teaching

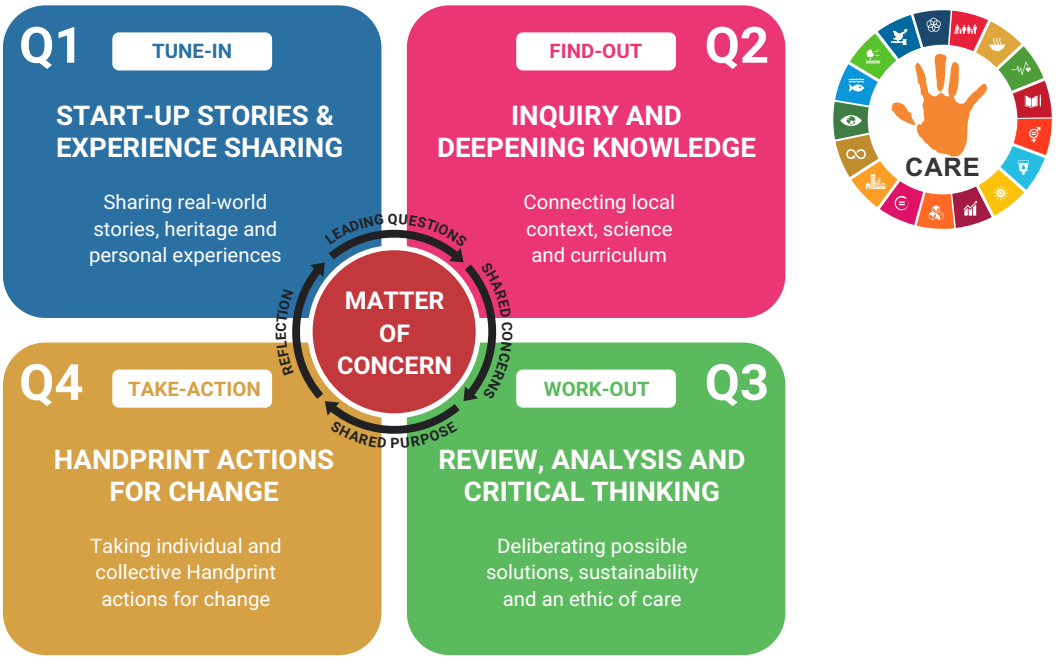

Figure 5: The initial framing of a Four Quadrant model of process for ESD (adapted from Edwards, 2014)

The Edwards-Vygotskian task sequencing progression offers teachers a wide range of teaching practices to support the activation of ethics-led learning around matters of concern that link to the subject they teach and the knowledge that they are entrusted with to convey to their students. In this way, the key tenet of a learner-led agency can develop around Handprint action-learning for the common good.

Throughout this work on ethics-led action learning, there was a need to take a critical look at the challenges of an ethics oriented, normative approach. Following the *Beutelsbach Consensus*, there are three central criteria to be considered (Schiele & Schneider, 1977):

- **No indoctrination or overwhelming of the learner**
  It is not permissible for teachers to hinder – by whatever means – learners from developing and forming an independent (political) judgement, by overpowering them with their own or a desired opinion. This ethical balance acts as the dividing line between education and indoctrination. Indoctrination is incompatible with the role of a teacher in a democratic society and the universally accepted objective of enabling independent judgement in our learners.
- **Treating controversial subjects as controversial**
  Matters which are discussed controversially on intellectual and political levels must also

be taught as controversial in educational settings. Differing points of view, conflicting interests of (global) actors and conflict lines have to be discussed with learners along with possible options or alternatives. This gives learners the opportunity to develop individual points of view and arguments, and to include them in their own assessment of an issue.

- **Giving weight to learner orientation and personal interests**
  Learners should be enabled to: a) analyse the political situation in society and their own position, b) actively participate in the political process, and c) find means and ways to influence the given political setting according to their own interests.

Concluding Insights

Ethics are linked to our understanding of what is fair or just. As humans, we have the capacity to think about our choices and so become responsible for our decisions and actions. Our classrooms can be sites of ethical deliberation and knowledge-led learning actions towards positive change and more hopeful futures. A four-quadrant model for deliberative action learning (based on Edwards, 2014) can support this process. It involves start-up stories (Q1), deepening knowledge (Q2), critical thinking (Q3) and actions for change (Q4).

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Chapter 4

LEARNING WITH REAL-WORLD STORY

How can story-sharing activate ESD?

Conventional subject teaching and learning often focuses on the giving and receiving of knowledge. Sometimes abstract concepts are taught without integrating affective elements and these may be poorly situated in a local cultural setting. This is where the use of inspiring and engaging stories to activate story sharing, as a learning process can be a powerful educational tool. It is often much easier to understand and assimilate new ideas when they are presented within the framework of a story and most teachers are highly proficient in storytelling. For generations, storytelling has been a means of education, entertainment and cultural induction. A key function of traditional stories has been to share moral values in younger generations.

Stories can initiate various pedagogically important processes, especially in primary education. "Talk has always been highly valued in primary classrooms in terms of literacy and the potential to develop critical thinking and effective communication skills" (Fitzgerald & Smith, 2016, p. 71). (Start-up) stories support and activate a dialogic open narrative process and deeper communication: Children react to a story, ask questions, share their own experiences (that are similar or quite different from those in the story), hear different points of view, share different social voices and present and discuss their tentative understandings of scientific theories.

Work with story to activate story-sharing in ESD learning processes can thus help teachers to raise issues to encourage students to share their experiences and ideas. In this way it becomes possible to share issues in an engaging form, to bring in new ideas, theories and concepts from textbooks for example and to bring knowledge to life with the inclusion of intergenerational knowledge as cultural heritage. Narrative skills are stimulated through the interaction between the narrator and listener(s), along with the acquisition of verbal and non-verbal narrative patterns and the development of narrative structures.

Developing with story and story sharing in Handprint approaches to ESD

In our Handprint CARE work with teachers we noted how learning was activated with real-world, true stories in story-sharing deliberations on local matters of concern. The curriculum-based and knowledge-mediated deliberations help activate lived experience, ethical dispositions and the creative ideas of learners. Teachers on a Fundisa (or Learning) for Change course in southern Africa noted how working with the inclusion of heritage and real-world stories enabled learners to begin to see school subject knowledge in the world around them.

Stories centred on real-world sustainability concerns were used in the early Handprint action approach at the Centre for Environment Education (CEE). The stories were useful for activating an **Explore-Discover-Think-Act (EDTA)** methodology (see Figure 6) as part of its *Paryavaran Mitra* (Friend of Environment) programme in schools in India (Pandya & Gorana, 2011). The emphasis here was on learners taking their learning beyond the classroom to engage with sustainability concerns of their local area. The local learning provided them with real-world findings to think about so that they could deliberate possible solutions or at least ease the challenges faced. Individual or collective Handprint actions for sustainability can then follow. The EDTA approach also encouraged learners to reflect and share their experiences with a wider community.

In a similar way ESD centred on matters of concern of local relevance gave rise to support problem-based approaches. Figure 6 also shows how these experiential learning approaches correspond with the earlier EDTA schema outlined above. The WWF (World Wide Fund for Nature) drew on these learning progressions for their locally relevant themes (LoReT) approach as part of a set of 'Methodologies for the Future' (Sellgren, 2012).

In this way – and according to Edward's task sequencing model (see Chapter 5) – we approached ESD as a learning journey (see Figure 6) emerging around story-sharing (Q1) and developing with the acquisition of subject knowledge. Here start-up stories were shared and explored to open up tangible and concrete issues while inviting students to share their stories and ideas including sharing any gaps in their knowledge. Story-sharing opens the way to clarifying ethical solidarity and raises questions for finding out more. This can be taken further

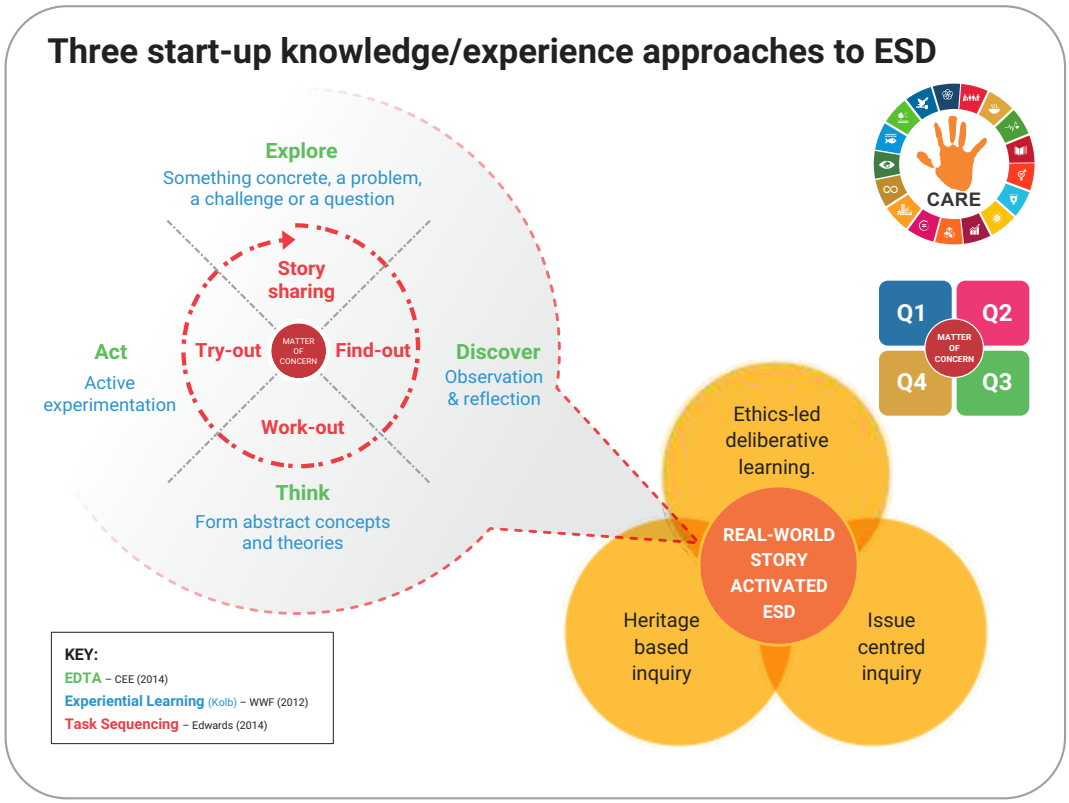

Figure 6: The integration of diverse task sequences into a cultural historical four-quadrant model of process for situated learning

through local enquiry (Q2) and deliberative learning centred on clarifying detail, working out possible solutions (Q3) and trying out sustainable solutions and lifestyles in small-scale change challenges (Q4).

What was notable across these early and emerging experiential and action learning approaches is that work with real world story for activating ESD reflected a mix of three key processes reflected in Figure 6:

- Ethical deliberation
- Issue-centred inquiry to solve problems, and
- Heritage and history-based inquiry to understand the origins of ethical concerns and sustainability issues.

Here real-world story and story sharing out of life experience was the catalyst for activating ESD around a mix of heritage, sustainability issues and ethical concerns.

Clarifying the role of story in Handprint CARE as ethics-led learning actions

Learning with story in Handprint CARE is centred on sharing real-world stories that we have experienced, heard about and are 'learning to read together' in the world around us. 'Real-world' is used alongside 'real-life' to point to how learning engages both the physical realities in the world around us and the life experiences of our students.

Appropriate stories should help engage attention. They are usually characterised by a short introduction to place, time and the main actor(s); sustainability related practice is described; and an account of the engagement with a concern may also be described. The story can be left open-ended for endings to be formulated by the learners.

Using real-world stories helps teachers to share sustainability issues in an engaging form, and to bring ideas, theories and concepts from textbooks (if used) to life, to include intergenerational knowledge as cultural heritage, and to combine this with sustainability concerns of the present and future. Story sharing

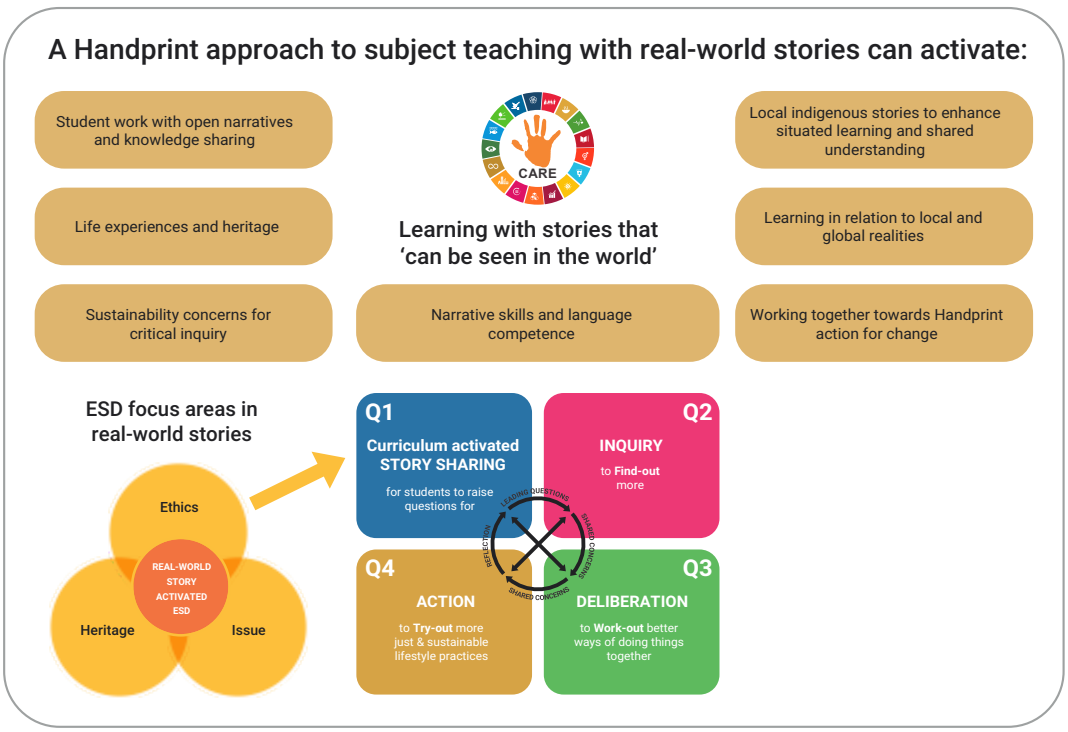

Figure 7: Pedagogical benefits of Handprint CARE's story-sharing

serves to locate and invite the plural inclusion of social, heritage / historiographic dimensions, to revisit what is already known to build “common knowledge” (Edwards & Mercer, 1987) or to recognise a gap in the knowledge. Local indigenous stories can stimulate the development of higher order thinking such as making comparisons and understanding the concepts of change and continuity that have occurred over time. Teachers and learners can use talk to work through their science ideas in co-defining and co-learning processes that are central to ESD as shown in the open four-stage model of process in Figure 7.

Deepening of local relevance

Stories that are both stimulating and that connect schoolwork with the local reality not only contribute to a positive learning environment but also support situated and transformative learning: “Meaningful transformation and transformative actions for sustainable development are most likely to take place in the community. It is in their daily lives, at the community level, where learners and people make their choices for sustainable development and act upon them. It is also in the local community where people find partners for their sustainability efforts” (UNESCO, 2020, p. 34).

In such educational settings characterised by “active learning”, learners are closely involved in the educational process and contribute as agents of change. By creating learning environments in primary school classes that encourage learners to acquire and extend knowledge and values through deeper discussions and reflections, by offering learner-led inquiry and activities (actively supported by their teachers in this process), learners can see why and understand that their learning matters. Simultaneously they learn that sustainability related issues often cannot be answered with a simple 'yes' or 'no'.

Many of the Handprint CARE start-up stories (see exemplars in Part Two) are centred on local matters of concern that raise questions for deliberative enquiry and open-ended, ethics-led experimentation.

An ancient form of storytelling through art/pictures called Kamishibai has been explored in this Handbook (see Part Three). Kamishibai/paper drama is a famous form of storytelling from the 12th century in Buddhist temples across Japan. This form of storytelling with pictures has the potential to lead the way to future sustainability, since the stories not only provide a positive learning pathway for

Working with open real-world story and heritage

*ESD can be activated around open-ended **real-world stories** that invite story-sharing and action learning towards positive **stories that 'show us the way',** (umkhomba ndlela) to more just and sustainable futures.*

Figure 8: Kamishibai became umkhomba ndlela 'stories that show the way'

learners but also inspire them to take positive actions towards greater social justice and future sustainability.

In southern African ESD design work with teachers and young children, the Japanese Kamishibai was re-named '*Umkomba Ndlela*' or stories that 'point the way'. Such stories are inclusive of local culture, care and future sustainability (see Figure 8). Similar work is being done in Germany and Mexico and the emerging picture story sequences have been found to open up a sense of cultural diversity along with commonalities and similar concerns in *local* school-in-community settings. (See Part Three for exemplars of picture story sequences.)

Concluding Insights

Real-world stories that invite students to share their experiences and ideas in their lessons can be the foundations for positive learning actions to resolve matters of concern in relation to future sustainablity practices.

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Chapter 5

EXPANDING SUBJECT PEDAGOGY FOR ESD

How can ESD be activated in conventional subject teaching?

The Global Education 2030 Agenda emphasises the role of teachers and educators as key actors in promoting change and in facilitating learners' transition to sustainable ways of life. “Building capacities of educators” is one of the five priority action areas. It is clearly stated that educators in all educational settings can employ innovative pedagogies to help learners understand the complex choices that sustainable development requires and to empower them to become change agents.” (UNESCO, 2020, p. 30). This positions ESD as a transformative process, on the inside, seeking to enable change. Following this insight, this chapter of the handbook focuses on the micro-level of classroom activities based on participation, empowerment and self-organisation. As stated by Sterling, this work is “agency centred and linked to collective social learning which can transgress the norm” (2016, p. 211).

In our Handprint CARE collaboration, we experienced how teachers can sometimes find themselves trapped between having subject content to teach and wanting to bring in an action learning approach. This is not always possible with the demands of curriculum coverage, conventional subject pedagogy and school assessment strategies. The conflicting concerns present many teachers with methodological dilemmas that are not easily resolved.

Anne Edwards reminded us that “successful teaching can never be a prescriptive and pre-determined delivery of a curriculum” (Edwards, 2014, p. 13). Her work has links to learning as described by Vygotsky: “Pedagogical experience demonstrates that direct instruction in concepts is impossible. It is pedagogically fruitless. The teacher who attempts to use this approach achieves nothing but a mindless learning of words (…), the child learns not the concept but the word, and this word is taken over by the child through memory rather than thought. Such knowledge can turn out to be inadequate in any meaningful application” (Vygotsky, 1978, cited in Daniels, 2002, p. 54). Vygotsky's crucial point is that

“everyday knowledge concepts must be brought into relationship with scientific knowledge concepts in ways in which they both develop” (Lotz-Sisitka, 2013, p. 31). Edwards (2014, p. 20) underlines Vygotsky's view, “that learning involves not simply internalisation, but also externalisation”; it is key to student agency so that students “learn to use powerful concepts and knowledge as they engage with and act on the world” (ibid., p. 16).

A Handprint CARE Approach to Subject Teaching

In our design research with teachers, we worked on how the foundations of quality teaching and assessment could be expanded to include learner-led action learning in conventional subject teaching. Here a school subject would commonly detail the concepts and competences to be taught, acquired or mastered in teaching and learning transactions with their students. These demands informed how conventional teaching practices in modern education commonly develop as 'teach-task-assess' processes for knowledge acquisition and skills development. We also found that many teachers naturally used these narrow instructional conventions to include cultural heritage and life experience for more meaningful learning. These processes develop as a normative foundation for quality teaching and as a starting point for co-engaged learning. When activated by real-world stories, supported by the acquisition of knowledge and skills (competences) for participatory learning, a transformative process of deliberative meaning-making and learner-led re-imagining through change project initiatives, becomes possible.

Keeping these insights in mind, a Handprint CARE approach came to be centred on an action learning expansion of subject teaching (see Figure 9) following Edward's model of task sequencing (2014) according to the need for an inclusive shift to learner-led application of subject concepts. Here agency can be strengthened through deliberative meaning-making. In this context, learning draws on everyday experiences including history and culture. These align with the engagement of learners' learning and develop with the local (or broader) communities. All these outcomes are not only necessary for ESD but are part of a key process where learners transition from memorisation of facts to the conceptual grasp of more complex, and more meaningful ideas. The skills and competences to apply knowledge that is acquired in more participatory and learner-led transactions strengthens a sense of agency towards doing things for the common good in real-world settings.

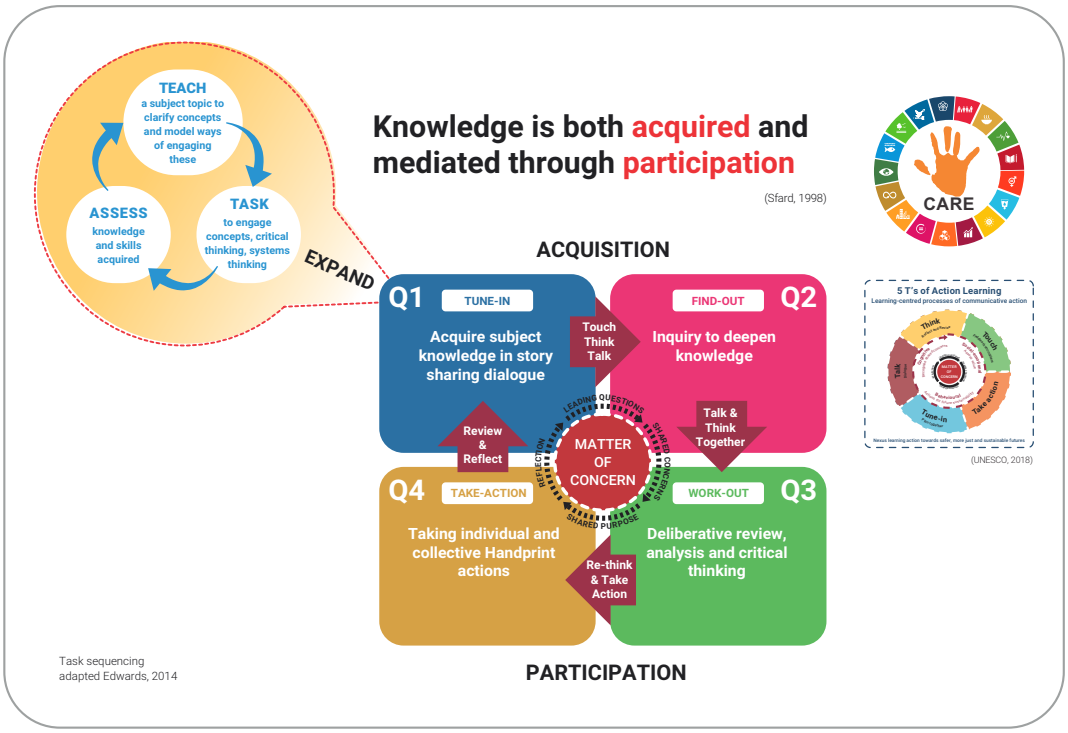

Figure 9: An action learning expansion of conventional task sequencing

The ideas of Edwards are strongly linked to Sfard's (1998) formulation of the central significance of two "metaphors" for the process of learning:

- The Acquisition Metaphor (AM), on the one hand, depicts the process of the "acquisition of knowledge" and the "development of concepts" (p. 6); key terms in the AM are internalisation, appropriation, transmission, grasp.
- The Participation Metaphor (PM), on the other hand, represents learning as an active involvement in an ongoing process of learning with others; key terms in the PM are practice, discourse, community and shared activities. PM "brings the message of togetherness, solidarity, and collaboration" (p. 8) in a reciprocal way in learning transactions where "the whole and the parts affect and inform each other" (p. 6).

The four quadrants model is a way of structuring different elements/phases of the teaching and learning processes, but it is not a blueprint. It is rather a "heuristic that points to the need for us to see learning as the learners' increasing grasp of the subject matter while also developing as learners; and to help teachers identify: the increasing meaning-making and agentive demands in each quadrant, how the roles of teachers change in each quadrant and how formative

assessment can help guide student engagement" (Edwards, 2014, p. 21). There are good reasons to follow the suggested four quadrants schema taking learners from Quadrant 1 to Quadrant 4. However, there are other possibilities teachers might explore such as applying the four quadrants in a different order.

In a school curriculum context, lesson planning often centres on the cognitive approach to learning. Sustainability education initiatives have placed more emphasis on socio-emotional dimensions and change practices. Such co-engaged approaches are supported by ethical drivers for seeing and doing things differently in a changing world. Learners begin to recognise matters of concern, assess value and begin to take action towards future sustainability practices. Such learning pathways constitute a useful mediating progression for deliberative learning environments in ESD (O'Donoghue, Taylor & Venter, 2018, p. 116). To plan for Action Learning, a 'Tuning-in' approach to ESD is proposed. Here one can find five elements (5Ts) that need to work together in transformative learning (see Figure 10). The elements are ***Tune-in, Talk, Think, Touch and Take action*** (ibid., p. 117). These elements are all part of learning actions but do not have to operate as a linear process. They can be activated at different stages and one can return to them in iterative progressions.

The 5Ts approach to active learning can start with the deliberative identification of an issue that is of concern to a group. This can be informed by both subject knowledge and the socio-cultural relevance of a local concern. An example of a local concern could be access to water or food. The objective is to establish the topics to be addressed so that action-learning transactions guide the students towards acquiring the necessary knowledge and competences. These enable students to connect with what is understood about future sustainability possibilities and what competences they may need to develop to achieve these. A key aspect here is to deliberate a topic of interest around which the learning can be developed.

The 'Tune-in' approach can be centred on story sharing (see Chapter 4) so as to provide a basis for deliberative learning around shared concerns. Here participants can use what they know to make sense of what they see and experience. The collective commitment of the learners allows them to develop actions to solve things collectively, while they share their concerns and deliberate what strategies are most appropriate.

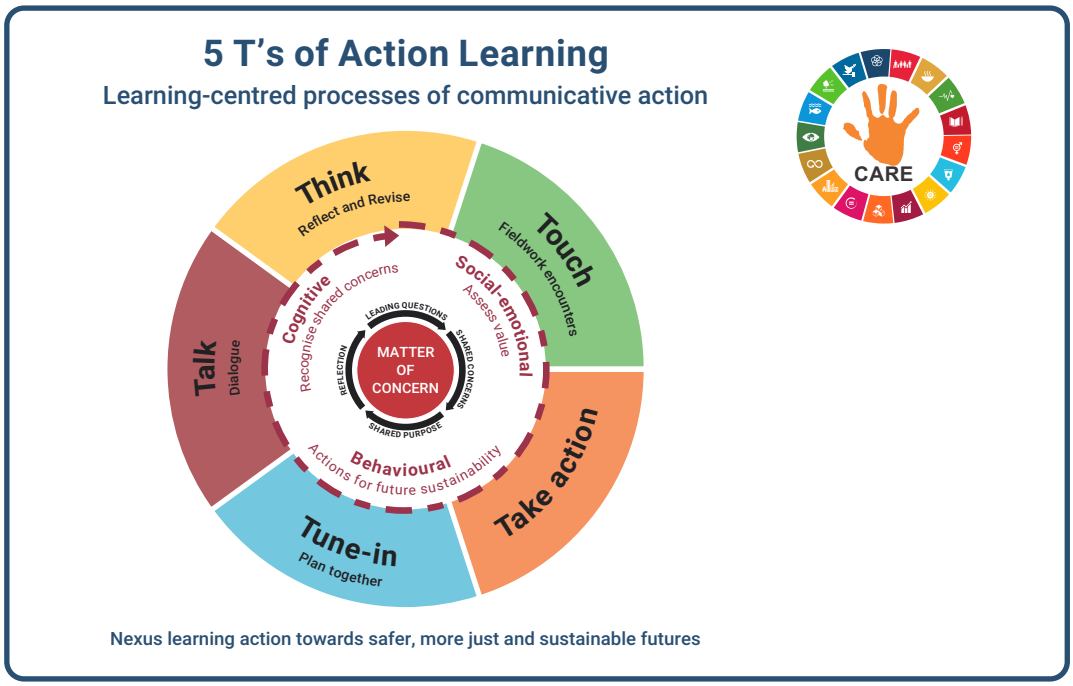

Figure 10: The 5Ts of action learning can be used to support learner-led ESD (O'Donoghue, Taylor & Venter, 2018, p. 116)

Concluding Insights

ESD is not about new and different methods. It is rather about good teaching that can be expanded to include learner-led activities and positive change challenges.

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Chapter 6

WORKING WITH THE SDGs

How can working with the SDGs enrich subject teaching?

Education with the SDGs

The Berlin Declaration on ESD (2020-2030) notes how: “ESD anchored in SDG 4.7 as an enabler for all 17 SDGs, is the foundation for the required transformation, providing everyone with the knowledge, skills, values and attitudes to become change agents for sustainable development” (UNESCO, 2021, p. 2).

Following the Millennium Development Goals (MDGs), many countries could achieve considerable increases in the enrolment of children in schools. Going beyond enrolment, we are now in the age of the Sustainable Development Goals (SDGs). We are told that these goals were developed through the largest public participation process in history, and unlike the MDGs, foreground sustainability. Goal 4 of the SDGs focuses on education so as to create effective spaces for learning, for collaboration, for critical thinking, for fostering ethics and democracy. This goal resonates with UNESCO's Education 2030 agenda and its ESD 2030 programme. Through SDG 4 we strive for an enabling learning environment that is embedded with the values of inclusiveness, dialogue and collaboration, peaceful resolution of conflict and an ethic of care. ESD is thus key to enabling quality in education.

Education is one of the most important instruments with which to realise the SDGs. For teachers, it is important to be aware of the various facets of each SDG for developing a deeper and broader understanding of the global and local problems with their students. This implies recognising the inter-linkages and interdependencies, on a global and local level, as well as amongst the goals. To empower ourselves as teachers and students, we need to foster the necessary skills and competences.

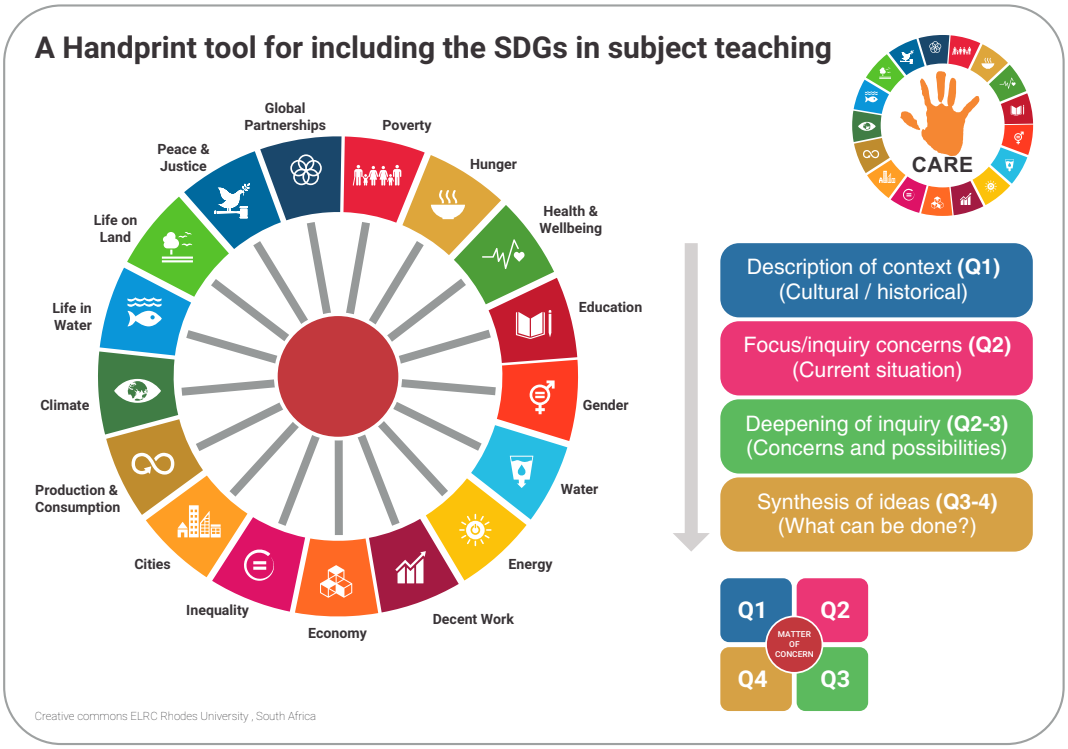

Figure 11: The Sustainable Development Goals (SDG) Wheel for Action Learning

Handprints are envisaged as a teaching tool that engages with the SDGs and encourages learners, not only to acquire knowledge and skills, but also to find ways to act on them (refer to Chapter 2 on *Handprint Origins*).

The SDGs can become a tool for teachers to use with their students for structuring a local inquiry in order to clarify and resolve a local matter of concern. The Handprint working group has developed an SDG Wheel for Action Learning to support this process (see Figure 11). The SDGs were introduced as a global sustainability agenda of concern. They were not initially seen as goals for students to take up and to act on. But the realisation arose that the best way to work with SDGs in curriculum settings was to place the local matter of concern at the centre of the wheel, to describe the context and use questions as foci for student-led inquiry. This brought inclusivity, ethical issues and knowledge co-production to the fore as students were challenged to relate subject content to local concerns. With inquiry and deliberation, the SDGs can be used to obtain a deeper grasp of the scope of sustainability challenges.

The SDG Wheel was mainly used at the intersection of Quadrants 2 and 3, which made it useful for students to describe the concern and context with deepening insights, leading to the raising of questions to be investigated. It was also effective as a summary tool at the interface of deliberating inquiry data and contemplating change challenges to explore and try out together. It was found that the SDGs themselves were not the central concern as these were generally superseded by the goals that the collaborating students set for themselves in their small-scale change projects.

Thus the SDGs do not need to be seen by teachers or learners simply as goals to achieve, rather they can help to deepen understanding of their own local concerns, by illuminating dimensions. For example, are there issues related to gender, or water, or climate linked to a local concern with a badly eroded area in the schoolyard?

An illustration of this can be seen in the SDG Handprint Lab programme developed by CEE. This programme aims to offer a unique learning environment to youth that involves an understanding of the SDGs through relating them to issues in a local area, while using their skills and knowledge to conduct research and to carry out Handprint actions for sustainability.

The Handprint CARE pedagogy is based on stories. These stories help activate and mobilise concerns and actions as these address concepts of sustainability. The exemplars in this Handbook (see Part Two) are a good way to explain the SDGs while also helping the students to engage with them.

Additional Background on the Sustainable Development Goals

During its initial years the environmental movement was focused on nature and nature conservation. The fact that environmental issues are closely connected to society and economy was given due consideration only when dialogues on sustainable development started. Linkages between the three pillars of development (economic, social and environmental) attained more clarity during the Rio+20 Conference in 2012. The UN General Assembly adopted the finalised Sustainable Development Goals in 2015, clearly stating that the goals are "integrated and indivisible and balance the **three** dimensions of **sustainable development:** the economic, social and environmental".

Figure 12: The SDGs (UNESCO, 2020)

The 17 SDGs and 169 targets are thus concerned with natural, social and economic dimensions, and are truly global, unlike the Millennium Development Goals of 2000 which focused on the developing countries. With the SDGs, the onus of sustainable development is not limited to the developing countries but includes the developed world as well. The SDGs are fairly comprehensive, although some challenges are not reflected well and not every issue is a stand-alone goal. Nonetheless, targets do address issues as wide ranging as poverty, population growth and plastic pollution.

Sustainable Development with its three pillars is a complex system as each dimension is unique but each is also connected to the other two dimensions. The systems approach to understanding sustainable development and the SDGs is a useful way to make the connections and understand the trade-offs (Hoffmann et.al., 2022).

Concluding Insights

The SDGs are both positive societal goals and tools for the in-depth analysis of local matters of concern that are related to school subject knowledge. They can thus be used in subject teaching as tools for exploring local concerns and engaging students in higher-order thinking skills towards positive learning actions in classroom settings.

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Chapter 7

DEEPENING LESSON DESIGN FOR TRANSFORMATIVE LEARNING

How do we design lessons for inclusive learning-led ESD in subject teaching?

Diverse perspectives on education and learning have emerged in recent decades. These pedagogical perspectives have endured in educational debate and in practice. Amongst the current diversity are, for example, constructivist, experiential, competency-based and capacity-building approaches to the planning of learning. These approaches have been developed and re-contextualised to guide lesson planning for both individual and group learning. ESD has developed as an inclusive and participatory process centred on learning actions and learner agency in education as a transformative process of learning-led change.

In planning ESD lessons, it is important to keep in mind that meeting the needs of all learners (including gender related aspects) is a form of social equity, which is also the crux of sustainability. This includes:

- seeking out and tuning in with the learner,
- acknowledging the learner's knowledge and experience,
- making content relevant,
- using multiple teaching and learning processes, and
- enhancing the learning environment (UNESCO, 2012, chapter 'Teaching Techniques for ESD').

With a special focus on primary education, this chapter shares some lesson planning tools for teachers wishing to expand and strengthen their lesson design practices. In principle, the organisation of primary schools offers many opportunities for ESD, as teaching and learning processes take place in a number of different subjects, so these can be addressed in a holistic way. It is worth noting that the natural sciences and the social sciences are generally taught in an integrated manner in primary schools.

A Handprint CARE approach calls for a pedagogy based on cooperation and

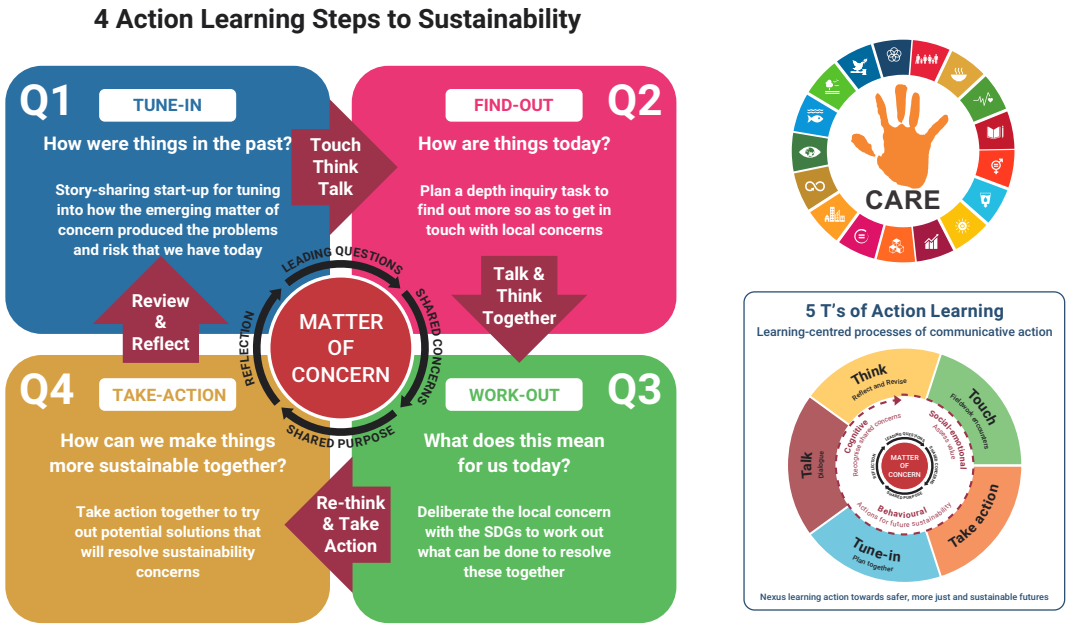

Figure 13: Some tools for planning action learning progressions

solidarity framed by an ethic of care (see Chapter 3). In addition, Handprint CARE illustrates that "pedagogy is relational. Both teachers and students are transformed through the pedagogical encounter as they learn from each other" (UNESCO, 2021, p. 51).

This chapter shares lesson planning tools for teachers wishing to expand and strengthen their lesson design practices. It offers lesson planning tools for a Handprint CARE approach focusing on deliberative **learning** actions (see Chapter 5) and the use of the SDGs (see Chapter 6) for the development of **competences** (see Chapter 7). At the same time the Handbook works with the cultural-historical (Vygotskian) perspective reflected in Edwards' four-quadrant model (see Chapter 4). Figure 13 reflects the combined use of the SDG Wheel and the 5Ts of action learning as tools for informing lesson planning with our students.

A lesson planning process can be informed by leading questions for guiding an open-ended, four-step process of ESD, that can be undertaken with students (see Figure 13). The questions provide useful starting points for mapping the heritage and subject knowledge and they invite students to join an ESD conversation that develops into deliberative learning through question-led, iterative processes that cover:

How were things in the past?

How are things today?

What does that mean for us today?

How can we make things more sustainable together?

Developing a deeper understanding of transformative learning for lesson planning

The four-quadrant lesson planning template for expanding conventional subject teaching using an Action Learning approach is based on the open-ended Vygotskian task sequencing progression after Anne Edwards (2014). This foregrounds the Vygotskian notion of situated learning as a cultural historical developmental process. It is important to challenge the exclusion of intergenerational heritage in modernity. This can be achieved by foregrounding the situated interplay of plural knowledge resources as deliberative action learning for social justice and future sustainability.

The deepening of understanding in the Handprint CARE approach to ESD was informed by two Critical Realist studies (Chikamori et al., 2019 and Schudel, 2016, see Figure 14). These studies strengthened our understanding of how important it is to give attention to cultural historical evidence of 'how the past has produced the risks we experience in the present'. This starting point can activate learning insights and develop student agency for ESD as ethics-led action learning (see Chapter 3 on Ethics).

Both studies draw on Critical Realism, after Bhaskar, to clarify how ESD needs to include the interplay of PAST (History/culture) and PRESENT (Life experience and concerns) for transitioning to FUTURE sustainability. Figure 14 develops a cultural historical perspective in a schematic framework for planning ESD with the inclusion of history and heritage 'knowing the past' for assessing 'what-is and what-is-not' in relation to the present day.

A dynamic process of 'learning through looking back' provides insights for assessing how the conditions of concern in the present have developed. Cultural / historical insights can inform positive learning actions that enable students to re-imagine 'what could be and what should be'. Here participants can challenge

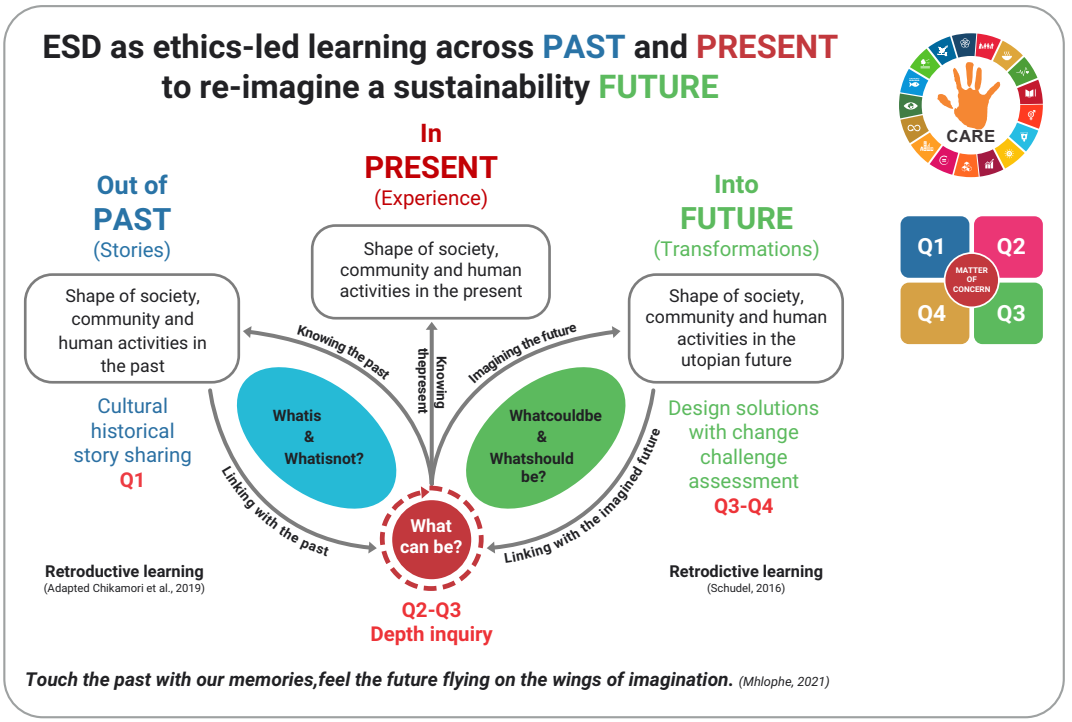

Figure 14: A Critical Realist schema for learning as an open-ended process of transformative meaning-making (Chikamori et al., 2021)

themselves and each other to enact 'what can be' achieved through small-scale, change challenges or Handprint actions for sustainability. Active learning serves to engage young students cognitively and emotionally in order to cultivate knowledge, the ability to 'translate' knowledge into action, and helps develop the disposition to act.

Lesson planning with students using the four-quadrant cultural historical approach offers a structure to organise learning. The open-ended, four-step process (see Chapter 5) of action learning, further enables participatory learning. Also helpful are the 5 Ts – Tune-in, Talk, Touch, Think, Take action (UNESCO, 2018) (see Figure 10). All this leads towards making things more just and sustainable so that everyone and everything can thrive in a more sustainable world.

A summary of the Handprint CARE four-quadrant lesson planning process

In **Quadrant 1,** the topic(s) of the curriculum are addressed in connection with local knowledge. This is expressed in a start-up story previously created by the teacher to invite story-sharing around a matter of concern. Each teacher will have a preferred way of engaging students' curiosity at this stage of a learning progression. The intention here is one of enabling opportunities to value one another and to learn from each other. As students practice exchanging ideas and views, they:

a) recognise their own knowledge and that of their community, and

b) identify a gap in their knowledge that can be filled, that is, identify necessary learning which is based on their previous knowledge/experiences.

Story-sharing is central to this part of the process as it triggers a conversation between the teacher and the whole class. This supports an exploration of how the key concepts presented are connected to daily realities and are relevant to matters of concern in the context of the learners and, indeed, that of the teachers.

Quadrant 2 is the space in which the students, with the teacher's guidance, inquire into the community about concerns, knowledge and practices of daily life that can be related to the topic(s) addressed in Q1. The inquiry in the family and/or community context, which allows them to explore their own context, can be individual, in pairs, in groups, or a combination of these. It is ideally accompanied by the teacher's instructions and orientations to suit the curriculum needs. The learners also determine their inquiry strategy with the teacher's support: the time available, the necessary resources, the actors with whom they will inquire, the places to visit, the strategies for asking questions, the talking and registering, etc. The inquiry activity can be complemented with books, the internet and other sources.

In **Quadrant 3,** the inquiry findings are shared and discussed. With the support of the teacher, the students can find patterns and trends, as well as compare concerns, knowledge and practices by community actors. Based on this, students can be encouraged to review, analyse and critically think about possible solutions which can be developed in the context of the community so as to address concerns. This offers the space where teachers and students deliberate on the possibilities of transforming their environment and begin to understand the potential of school and community knowledge, and their connections and linkages. In this quadrant, the teacher anticipates that the connection between school and community knowledge is desirable and helpful to address specific situations in which it is necessary to solve some problem of relevance to the community. Furthermore, in Q3, students are given an opportunity to look at problems from an ethical point of view by analysing contemporary issues.

In **Quadrant 4,** the Handprint actions for change are carried out (it can be one or more) in which students and teachers plan, develop and evaluate a specific activity that contributes to solving, totally or partially, a problem that is relevant in the school, family or community context. This quadrant is the space for the teacher to reflect on the learning of the contents, their relevance and pertinence, the development of skills related to critical and systemic thinking, as well as other thinking skills such as analysis and comparison. It is the quadrant where the students and the teacher evaluate the learning that the progression through each of the quadrants triggered through various activities, and their results. Evaluation can also be a collaborative activity with the students.

Systems thinking

The reflection on the development of skills and competences has to be prepared in planning the lesson; careful consideration should be given to how certain learning outcomes can be achieved. With regard to the development of skills and competences (see Chapter 8) it is important to mention that students can only develop them step by step over time; this cannot be achieved within a few weeks or months. Teachers are invited to support such processes in an ongoing way. In primary education settings, for example, the development of "systems thinking" for dealing with complex situations is helpful. (A forthcoming book on Systems Thinking by Thomas Hoffmann, et al. (2022) will be useful here). In this work we learn to examine a topic/system from different, multiple perspectives and consider them in relation with one another. Rather than simply passing on isolated information, the work entails making connections. Such multiple perspectives can focus on "environment – economy – social – culture/heritage", "past – present day – future" and / or "local – global". Recognising that two (or more) parts of a system are related and interconnected in some way is a basic systems thinking skill. Furthermore, relationships can form feedback loops – this is another component of systems thinking (Hofmann-Bergholm, 2018).

This Action Learning Planning using the four-quadrant model presents a structure that some teachers may find rigid. However, understanding and adapting the framework through its implementation is the first step in the process. Later, the teacher can design their own learning progressions or implement frameworks designed by others. Here the ability to be flexible and creative is really helpful.

The proposed Action Learning Planning is connected with the changing roles of students and teachers. Students are increasingly encouraged to learn with the teacher and be more active, engaged participants in the learning processes. The role of a teacher changes from being an expert who transfers structured knowledge to being a facilitator of learning processes, partly shifting power, responsibility and decision-making to the students (Henze et al. 2020, pp. 96-97).

Teaching and planning are framed from the perspective of students, their life contexts (socially and culturally) and learning experiences. The role of the teacher is thus to create learning settings that support dialogue and reflection and encourage the sharing of students' experiences and reflexive thought processes. Students are thus encouraged to strengthen their competences and to engage in Handprint actions for change.

Concluding Insights

A deepening of lesson planning can be achieved with real-world start-up stories that reveal how the past has produced matters of concern in the present day. This can enable learners to identify what has been neglected or could be done differently to make things better. The combined use of Edwards' four-quadrant model, the 5Ts of action learning and the SDG Wheel can be useful tools for informing lesson planning.

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Chapter 8

INCLUDING ESD COMPETENCES

How can we work with curriculum and ESD competences in subject teaching?

Clarifying a Handprint CARE Approach

Subject teachers often ask **'How do we reconcile ESD competences with concepts, skills and competences specified in the school curriculum?'**

Competence can be defined as the ability to apply knowledge guided by values, including the readiness of the individual to act. When including ESD competences in lesson planning and assessment, the challenge is to align the curriculum competences for each subject with ESD. Here we noted how, in a Handprint CARE approach, ESD competences develop as students learn to **recognise** concerns, **assess** value and **act** towards more just and sustainable ways of being. Approaching ESD in this way helps teachers to align and bring together subject knowledge (cognitive) with ethics and values (social-emotional) in learning actions to effect change (behavioural practices) (see Chapter 5). In this way teachers began to see ESD as an integral expansion of conventional subject teaching that does not require any radical changes in how they teach.

How do lesson progressions and ESD competences align in learning processes?

Working with a four-quadrant schema for action learning and the Brundiers et al. (2021) map of competences, we noted how **knowledge** sharing contributed to students recognising systemic concerns with developing **know-how** and ***agency* for being able to** do things better together (see Figure 15).

Here **Q1** and **Q2** of a deliberative learning progression can develop as a tune-in or start-up process of systemic **KNOWLEDGE** acquisition towards ***'learning to know'*** and engage with matters of concern. Figure 15: A comparative analysis of ESD competences and a transformative learning sequence

This learning can produce increased **KNOW-HOW** (Q2-Q3) with deepening systems thinking, critical reflection and problem solving towards ***'learning to do'*** or action taking with expanding competence.

Along the way, learning can develop through reflexive modes of action (Q3-4) towards **BEING ABLE TO** envisage changing conditions for ***'learning to live together'*** that includes ***'learning to be'*** active citizens in more just and sustainable environments.

This initial framing of competences in learning progressions was useful for helping teachers to reconcile their jobs as subject teachers with the additional competency specifications for ESD. Through an alignment exercise (using Figure 15) lesson planning came to include intergenerational heritage as a decolonising process alongside school subject knowledge and life experience. Deliberative learning developed through local inquiry and critical thinking in Handprint learning actions towards more just and sustainable futures. The theory and learning progressions were understood by most teachers but many still found lesson planning too complex so they asked **'Is there a more practical and simplified way of applying competences for lesson planning?'**

The initial comparative analysis of competences aligned cognitive, social-emotional and behavioural outcomes, as specified in the curriculum, with ESD. Here **systemic** reasoning emerged as a foundational capability in both subject teaching settings and ESD. We found that it was possible to cluster 'systems thinking', 'critical thinking' and 'problem solving' as knowledge-informed capabilities centred on the acquisition of heritage and subject knowledge for evaluative learning in relation to local matters of concern. These initially opened up across Q1 and Q2.

Flowing from the activation of systemic competences for ESD as knowledge-led action learning (see Chapter 5), **strategic** agency was identified as an applied competence centred on 'reflexive modes of action'. This involved learning to **anticipate,** clarify **norms,** develop **strategic** initiatives and **collaborate** with others with a reflexive **self-awareness** that could be activated and assessed across Q3 and Q4

Working from the perspective of a Handprint CARE approach to ESD, competences can best be activated in deliberative processes of knowledge co-production as participants recognise concerns and assess value towards

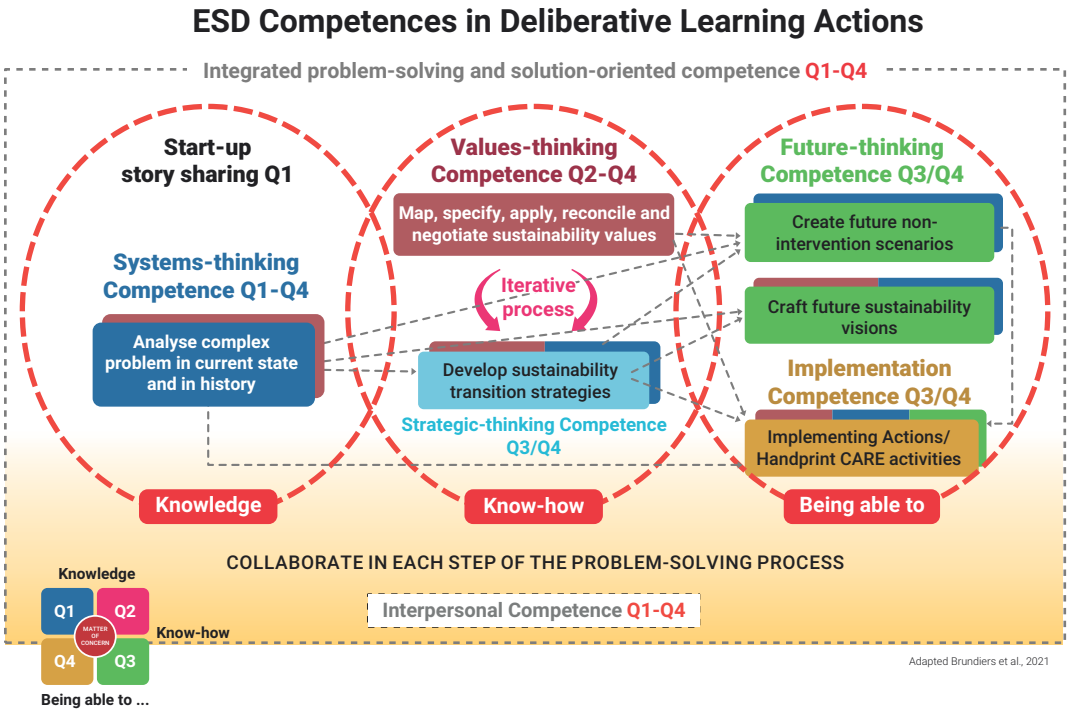

Figure 15: a comparative analysis of esd competences and a transformative learning sequence

Handprint actions. Competences develop in learning progressions such as this where students are challenged to engage with sustainability concerns together.

Competences in ESD and Education

"Competences refer to those cognitive abilities and skills that people need to overcome problems, and to their willingness to successfully overcome problems in different situations", according to Josef Leisen (2021), a German professor of didactics in physics and a specialist of language-sensitive content teaching. He illustrates the understanding of competences with the following concise formulations:

Competence = knowledge + willingness + action

Competence is the active use of knowledge and values.

This definition aligns with how competences are defined for ESD by UNESCO.

The educational concept of competences is not about students being taught fewer facts, but rather suggests that students learn how to make better decisions using that knowledge while guided by values. In accordance with Education for

Sustainable Development (ESD) concepts and emerging global challenges, the values to be considered are connected to the principles of sustainability which includes care for nature, respect for diversity, reducing disparities in standards of living, commitment to global and local social responsibilities, and, most importantly, peace in our times.

The overarching framework of ESD competences inspired by the UNECE Strategy for ESD (2011, 13) reflects a wide range of aspects, and focuses on **competences for educators:**

- **Learning to know** refers to understanding the challenges faced by the society both globally and locally and the role of educators and students.
- **Learning to do** addresses the developing of action competence and practical skills in relation to education for sustainable development.
- **Learning to live together** contributes to developing mutual understanding, respect and appreciation for interdependence, pluralism and peace.
- **Learning to be** is developing one's personal attributes and ability to act with greater autonomy, judgement and responsibility in relation to sustainable development for the future.

The underlying ESD characteristics of each of the above include: ***a holistic approach,*** which includes integrative thinking, dealing with complexities, and practice; ***envisioning change,*** which provides opportunities to discover alternative futures, learn from the past and inspire engagement in the present; and ***achieving transformation,*** which serves to change what it means to be an educator, the way of teaching and learning, and to transform the education system as a whole (ibid., pp. 16-17).

There is general agreement that transforming processes for a just and sustainable world are based on some crucial ***cross-cutting competencies*** that are necessary ***for all students*** of all ages worldwide – developed at different age-appropriate levels. In the box given on the following page, these crucial competences are explained briefly. These can be considered by teachers of primary schools when selecting topics and designing and planning educational activities for their students.

It goes without saying that teachers have to adapt the selected competences they wish to promote to the age and learning levels of their students. Simultaneously

they have to keep in mind the important insight: “Competences cannot be taught, but have to be developed by the students themselves. They are acquired during action, on the basis of experience and reflection” (UNESCO, 2017, p. 10).

Key Competences for Sustainability

The following eight key competences, developed by UNESCO, are cross-cutting competences that are necessary for all learners of all ages, worldwide, and are seen as crucial to advance sustainable development.

Systems thinking competence: the ability to recognise and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.

Anticipatory competence: the ability to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.

Normative competence: the ability to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.

Strategic competence: the ability to collectively develop and implement innovative actions that strengthen sustainability at the local level and further afield.

Collaboration competence: the ability to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.

Critical thinking competence: the ability to question norms, practices and opinions; to reflect on one's own values, perceptions and actions; and to take a position in the sustainability discourse.

Self-awareness competence: the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.

Integrated problem-solving competence: the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the above-mentioned competences.

Source: UNESCO SDGs Learning Objectives, 2017

Concluding Insights

The competences specified for subject teaching integrate well with ESD competences in lesson progressions that foster the learner-led application of knowledge and higher-order thinking skills.

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Chapter 9

ASSESSING LEARNING

How do we deepen and extend assessment for ESD?

Assessment is an integral part of teaching and learning. When participants are involved in assessment it can enable them to identify key concerns as a process of tuning in to learning. A learning progression can also be expanded to develop and track evidence of developing competence. These assessments can include what is being done together, as a process of assessment for connecting with, and then for reviewing what is being achieved. They can also be developed as a process of summative assessment that expands assessment practices beyond conventional attainment tests.

Different assessment strategies are used in different countries and many apply national level tests. For example, India conducts a National Assessment Survey, regularly, for different grades. The new set of learning outcomes laid out subsequently for each grade in each subject discipline is an attempt to standardise the assessment parameters so as to acquire more evidence on the learning levels of students. This data can provide teachers with useful reference points for improving their subject teaching and for relating this to the desired measures of success.

In most national education systems subject assessment of learning is centred on the knowledge and competences acquired but this can also include the dispositions or outlooks being developed and acted upon by students. A Handprint CARE approach to subject teaching works with the concept of 'change projects'.[3] Change projects can be assessed for their effectiveness in reducing or resolving matters of concern. As Handprint CARE actions have become more integral to subject teaching, evaluative learning actions are expanding the scope

[3] *A Change Project is simply a story of a change that someone has made, whether at home, at school, at work, or as part of recreation, to resolve an environmental issue or risk. The goal is to make a change in perspective and take action towards more sustainable practices.*

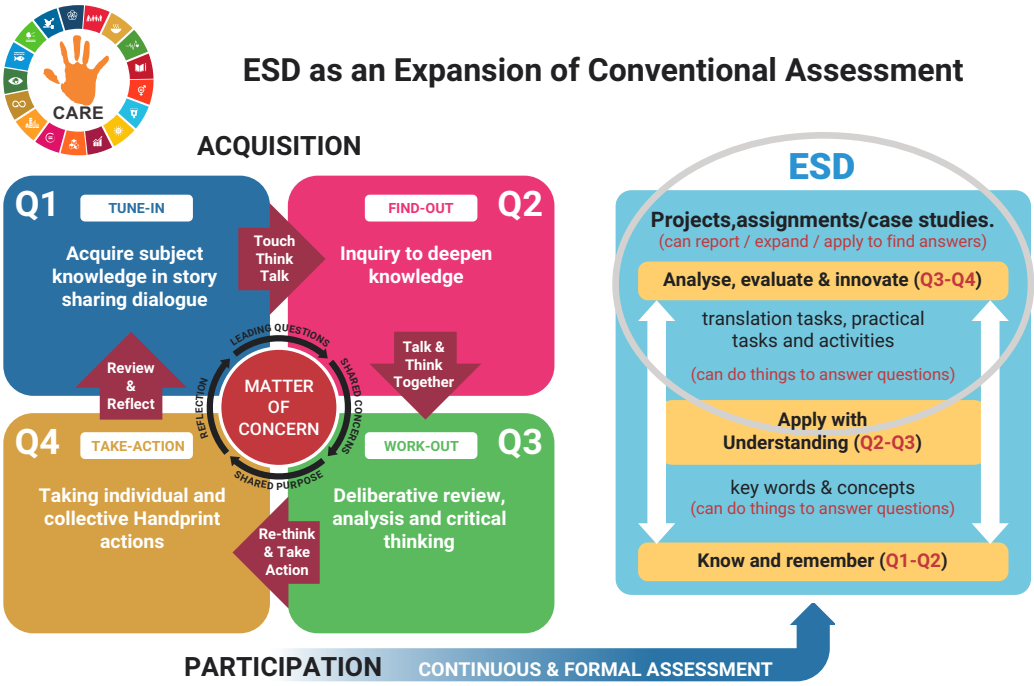

Figure 16: Conventional assessment of application and higher-order thinking skills for ESD

of a subject and activating higher-order thinking skills and action competencies of young students (see Figure 16). Here continuous assessment activities can allow teachers and students to pace learning in a way that can allow participants to engage with subject concepts in practice and to deepen their understanding, rather than simply learning to memorise concepts and facts so as to answer exam questions.

After deliberation on ESD and assessment many of the participating teachers asked:

Is there a place for conventional assessment in ESD?

In a review of a national assessment processes, examiners reported that the patterns of attainment in school subjects reflected how students were finding it difficult to use subject knowledge in real-world situations. Students also struggled to give answers to examination questions that require higher-order thinking skills. In their assessment of their joint lesson-study work on a Fundisa for Change (Learning for Change) programme, teachers noted a big improvement

in students being able to relate subject content to the world around them as well as lesson deliberations that reflected higher-order thinking skills. This improvement was evident when students were engaging in local, small-scale change projects. From this it can be deduced that conventional assessment, using Blooms Taxonomy, had a place in ESD (see Figure 20) and could be expanded into more in-depth assessment of significant learning and applied competence (see Figure 21). This illustrates how an assessment strategy can be based in conventional educational assessment of attainment, as well as being applied for higher-order processes of application, analysis, synthesis and evaluation.

Many participating teachers asked an additional question, namely:

How can we assess significant learning that is particular to ESD?

Shumba, Mandikonza and Lotz-Sisitka (2021) explored how significant learning is often missed by conventional assessment practices. In work with teachers on the UNESCO Sustainability Starts with Teachers (SST) programme, they drew on the work of Dee Fink (2013) to expand conventional assessment. By expanding

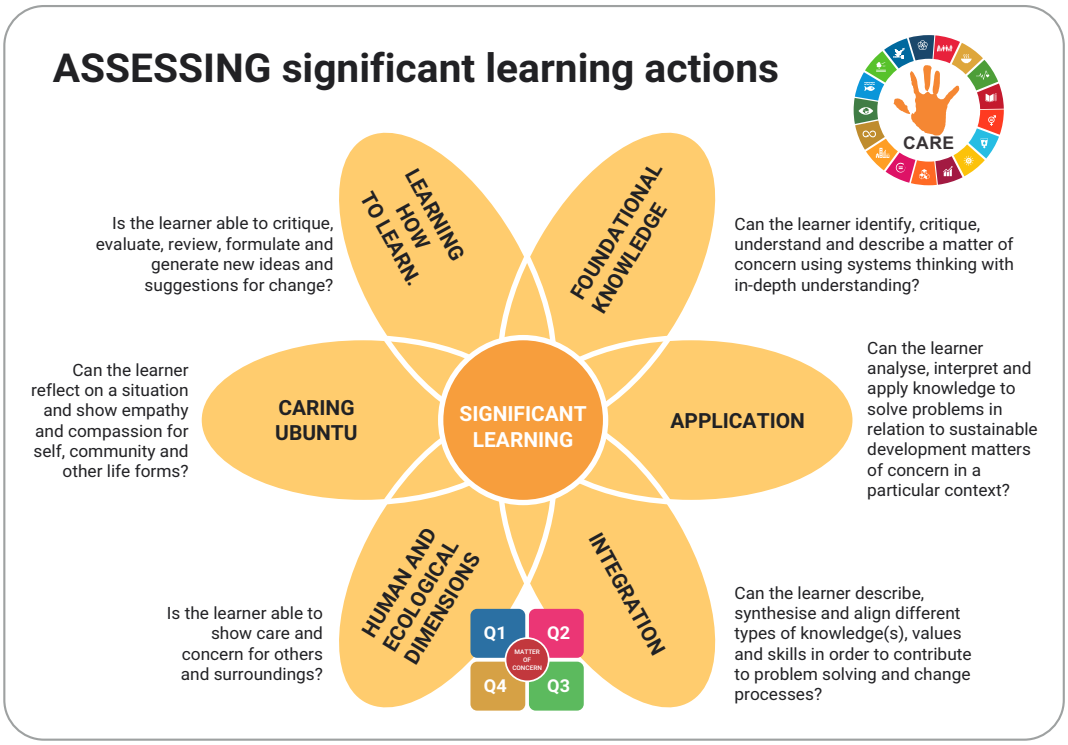

Figure 17: A schema for the assessment of significant learning (Shumba et al. 2020)

conventional assessment they were able to explore and document significant learning on environment and sustainability programmes. This expanded assessment enabled transformative learning to also be included in addition to conventional classroom practice. Figure 17 is a graphic summary of a schema that develops a wider scope for evaluation in ESD. It enabled participants to assess significant learning that was beyond the scope of conventional classroom assessment practices.

The inclusion of ESD as an expansion of conventional assessment commonly starts with an assessment of prior knowledge (formative assessment) to align a learning programme within the capabilities and interests of students. Formative assessment in ESD is usually more collaborative towards an assessment of how things were in the past and how past practices have given rise to matters of concern in the present day (see Chapter 8). This helps participants to give assessments of:

- how things have changed,
- what is going wrong,
- what is not yet known, and
- what we need to find out about and resolve together.

In this way, assessment becomes a key focus area in an ESD approach to the teaching of subject disciplines. ESD requires critical thinking, communication regarding complex real-life situations, participatory learning and action where the traditional forms of assessment (e.g. true/false, multiple choice tests, etc.) might not be adequate or effective in gauging learning related to sustainability.

Assessing both the quality of ESD programmes and the students' attainments (knowledge, competences, attitudes and values) can be challenging. It needs to be undertaken as an inclusive and a continuous process that enables students to interact in a social learning process, and to get and give feedback, as their learning and action competence develops.

Recognise (what is known?)

Identifying how learners recognise issues around them is key to assessing learning. *For example, whether learners are able to recognise the dwindling population of bees in their locality or elsewhere, and reasoning why there has been such a decline.*

Assess value (what is important to us?)

Once learners identify and recognise the issues around them, it is important to understand how they assess values around such issues. *For example, are they able to connect the importance of the dwindling population of bees with that of food production and livelihood of people, or indeed, with their own lives?*

Act (what do we need to do?)

The next step in assessing learning is to see how learners decide to take action regarding the various issues, and what solutions they suggest and get involved in, for those issues.*For example, what ideas do learners come up with to increase the bee population and how seriously do they participate in such activities?*

Assessing learning, as elaborated above, will also cater to core ESD competences such as:

- Anticipatory competence
- Normative competence
- Strategic competence
- Collaboration competence
- Critical thinking competence
- Self-awareness competence
- Integrated problem-solving competence
- Systems thinking competence

(UNESCO SDG Learning Objectives, 2017; see also Chapter 7 on ESD Competences)

Examples of assessing students in the context of ESD competences

1. The puzzle activities suggested in the exemplars on Bees and Pollination, and Migration have been mentioned above. Using the puzzle, the teacher could assess students on aspects such as ability to recognise and understand the interconnectedness among components and to give reasons for such interconnectedness. This will help in assessing systems thinking and collaboration competences.

2. Through start-up story and experience sharing by students, the teacher could assess critical thinking, self-awareness and anticipatory competences. Reflection questions can also be used for assessment, such as: What are the two key questions that come to mind after listening to the story; According to you, in what ways can the problem narrated in the story be solved; What else could have been done by the main character in the story to tackle the situation?

For the Handprint CARE start-up stories and the associated story-sharing provided in this Handbook, it is important to raise questions for the evaluation of the learning in an ESD learning progression, as it leads to the:

- Development of the core of the student-led processes of finding-out,
- Working out of things together, and
- Deciding on what change challenges to take up.

Continuous assessment in this context becomes an inclusive process, while, at the same time, conventional approaches to assess learning in developmental and fair ways, including in test and examination settings, should also be used judiciously. For ethics-led learning, the assessment process could be more reflective and performance-based, and can use feedback from educators and peers, and self-evaluation, to empower students to monitor their own learning processes and identify possible areas for improvement.

Concluding Insights

A Handprint CARE approach can strengthen higher-order skills. Conventional assessment is still relevant and conventional assessment tools can be used to assess the higher-order thinking skills activated through ESD. Assessment can also be expanded, however, to include significant learning that was not included in the conventional assessment. It is important to think of assessment not only as assessment *of* learning, but as assessment *for* learning.

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Chapter 10

AN ESD PLANNING PROCESS

How do we plan ESD in inclusive curriculum-activated ways?

Most teachers participating in Handprint CARE education programmes initially approached ESD as a desirable extramural 'add-on' to an already crowded curriculum. Here many teachers considered ESD as primarily an outdoor and experiential learning opportunity. In this way ESD was a 'side-bar' to their mainstream job of teaching a subject.

In a recent review on teacher readiness to teach with an ESD focus (UNESCO and Education International 2021), educators reported how they were unsure about appropriate pedagogy and assessment and whether to approach ESD as a personal or group learning process. They also noted that there was still little curriculum coverage of ESD topics, a shortage of curriculum materials, as well as a lack of opportunities for students to act for more just and sustainable futures in school settings.

The Handprint CARE approach assists teachers to approach ESD as a curriculum-based expansion, to illustrate that ESD could arise in teaching settings and can play out as a transformative learning process. This can take place in a wide variety of ways where teachers and their students worked together for a common good. We worked with a schematic overview (Figure 18) to help us clarify suitable lesson planning strategies for the inclusion of ESD in local socio-cultural and curriculum contexts of teaching and learning.

For Handprint CARE we worked with this schematic overview to help us clarify suitable lesson planning strategies for the inclusion of ESD in local socio-cultural and curriculum contexts of teaching and learning by:

1. **Planning active learning together**
   Exploring how Handprint CARE emerged amongst young children who were enthusiastic to take positive actions for the common good **(see Chapter 2)**

2. **Including an ethics of CARE**
   Approaching ESD as an open-ended process that could be engaged as an ethical imperative in classroom settings **(see Chapter 3)**

3. **Co-defining of shared concerns with the SDGs**
   Clarifying complex concerns with the SDG Wheel **(see Chapter 6)**

4. **Sourcing real-world stories for story sharing towards ethics-led action learning**
   Working with start-up stories as an expansive learning process to activate the SDGs (see **Chapters 4 and 5** on story and expansive learning)

5. **Clarifying curriculum and ESD competences**
   Working from curriculum topics to activate action learning competences in curriculum settings **(see Chapter 7)**

6. **Planning learning together**
   Developing a deeper grasp of ESD as co-engaged deliberative learning. Seeking to understand how sustainability concerns developed out of the past to become manifest issues in the present. Noting how a situated grasp of the emergence of risk could activate a reimagining of more just and sustainable futures together **(see Chapter 8)**

Figure 18: Framework for ESD programme planning - Adapted from UNESCO- Sustainability Starts with Teachers (SST).

7. **Wider and more integral assessment practices**

   Working with wider and more inclusive approaches to assessment within a new social contract for education **(see Chapters 1 and 9)**

Through the above processes it is notable how teachers are able to plan subject teaching and learning activities from different perspectives. On the one hand, they are able to select appropriate knowledge, issues, skills, perspectives and values as attributes which can then be mobilised for working out and reflecting the environmental, social and economic spheres of sustainability. On the other hand, it is important for teachers to encourage learners to ask questions, analyse, think critically and make decisions. In this way, teaching and learning moves from a situation dominated by teacher and subject-centred learning, to a more participatory and student-led process of action for sustainable living. Planning, realization and reflecting /assessing of Handprint activities create opportunities for students to engage, to develop creative ideas (including the different voices / perspectives of the classroom), to motivate each other, and to experience cognitively and emotionally responsibility and self-efficacy. Self-efficacy is based on the belief that you are capable of carrying out a specific task or of reaching a specific goal. By working out Handprint activities students experience that they have influence, and can make a difference. These experiences can contribute to develop hope for a more just and sustainable world.

For a Handprint approach, the traditional role of a teacher changes step by step, from being an expert who transfers structured knowledge to being a facilitator of knowledge mediated learning. This comes with a partial shift in power, responsibility and decision-making to the student as a deliberative co-learner, working together with a teacher, to co-creating knowledge and to co-developing new ways of knowing and doing things together for a common good.

Continuing steps on an ESD learning journey

The Handprint CARE approach starts with subject teaching but does not end there. The journey continues by following UNESCO's proposal for a new social contract for education calling for a school education that strengthens ESD and capability. This includes an important question by Reimers (2020, p. 12): “What should students learn when, how can they be supported in learning it, and what and how should teachers teach and how can they be supported in learning so they can teach effectively?”

With regard to ESD and Handprint CARE, it is important to develop, step by step, possible ways of relating the school organisation to ESD. School organisation that is conducive to conversation and enhances students' possibilities for learning and capacity building for a complex and uncertain surrounding world, turns “the ESD vision into a practical reality”, and contributes to quality education (Mogren, Gericke & Scherp 2019: 509) by applying different strategies and approaches. In a way this is what the “Whole School Approach” is all about. A school organization that promotes ESD in a holistic approach is becoming a model for learners by integrating sustainability issues in more and more areas of the institution (curriculum, organizational culture and values, participation of learners, management, cooperation with the local community and other partners in networks …). This requires shared responsibility and commitments including the school management (Henze et al. 2020: 134 ff.)

A first step could be working out ways to link a subject topic with other subjects by identifying the concept or matter of concern in different subjects, as ESD is interdisciplinary in nature. The ability of teacher educators, teachers, and eventually students, to draw such connections between ESD concepts and different school subjects and to work collaboratively and distribute leadership, will lead the way to wholesome/holistic education. This is especially significant in the case of countries where there are strict disciplinary/subject boundaries, and might not apply for countries where teachers have autonomy and flexibility within the curriculum, or where a theme-based approach is followed without any subject discipline boundaries. In primary education there are good opportunities, since natural and social science issues are usually taught in one subject.

The development of continuous collaboration with the local community (with local leaders, families, non-governmental and private sector actors working with sustainability issues) combines the curriculum with extended inter- and transdisciplinary learning opportunities. Working in this collaborative way transforms learning environments, and contributes significantly to quality education. This is of crucial importance as “meaningful transformations and transformative actions for sustainable development are most likely to take place in the community” (UNESCO, 2020, p. 34).

Teachers play an important role in implementing ESD, they are “key actors in facilitating learners' transition to sustainable ways of life” (ibid., p. 30). We all know that teaching is a complex and challenging profession. The traditional

model of schooling refers to a role of teacher who remains individually responsible for his/her own lesson plans and learning materials. This model places huge pressure on many teachers in different parts of the world. We promote the idea that teachers (and multipliers) work collaboratively to mobilise knowledge through dialogue, to support each other and to co-construct sustainability issues. Implementing ESD and transformative learning needs ongoing support, however, and continuing professional development, capacity building through workshops and training opportunities as well as "cooperation and collaboration (that) are woven into their modes of working" (UNESCO, 2021, p. 81).

All readers of this handbook are invited to join us, and, by working together with Handprint CARE as a culturally and ethics-led social learning, help make the world a better, more peaceful and more sustainable place:

Learning to look after others
to best care for each other and to
explore change projects to improve
the surroundings that we all share

Concluding Insights

The inclusion of sustainability matters of concern in subject teaching can be achieved as a curriculum-activated process with students and teachers working together to plan learning activities, change challenges and handprint actions for sustainability.

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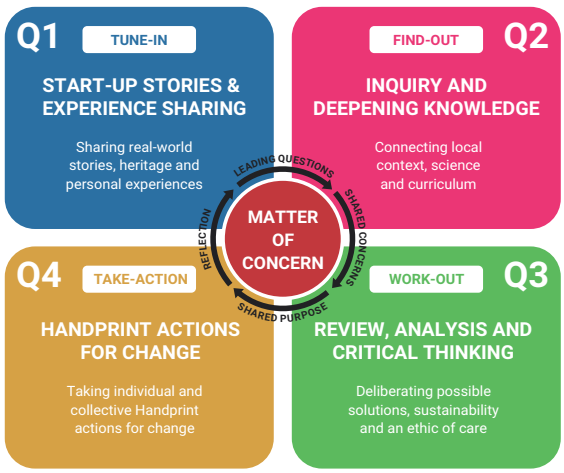
Part II

Exemplars for the inclusion of ESD in school subjects

Introduction

This part of the Handprint resource includes four exemplars for environment and sustainability topics. Exemplars are models, or resources, which are designed to support and promote the application of theory into practice. The level of the exemplars provided is appropriate for the age group 8-13 years but can be adapted for use with other grades by creative teachers. The topics of the different exemplars are developed around real-world start-up stories from different countries across the globe.

All of the materials and activities suggested are intended to offer perspectives, and to provide possibilities and illustrative starting points for working with the Handprint CARE approach; they are not 'completely finished'. 'Did you know' sections provide some thematic background knowledge for teacher trainers (and teachers). Depending on local learning conditions, teachers have the important task of adapting the material to the needs of the learning group; they can modify tasks and/or include additional information based on the age and grade of the learners.



Each exemplar has been designed using the four quadrant Handprint CARE pedagogy which is introduced in chapter 3. The suggested quadrant model (from Q1 to Q4) is one of the many ways to drive learning and can be followed in any order, by the teacher, based on the learner's level of understanding and their local environment. Teachers may begin with introducing real-world start-up stories and can also invite learners to share their own stories and experiences and to raise questions for learner-led inquiry, evaluative deliberation and action.

The start-up stories can be used to present learners with matters of concern that leave room for reflection. This enables the students to understand different perspectives of the issues in hand (Quadrant 1) and to raise questions which will take them into local depth-inquiry (Quadrant 2). Local inquiries can include different activities like conducting surveys/interviews in their immediate surroundings, going on a field visit, solving eco-puzzles etc. The local depth-inquiry is the 'vehicle' for transforming students gradually into critical thinkers.

This helps them to clarify their formative ideas through mediated conversations that can be carried into deliberative modelling, and the learners become able to design sustainable solutions for emerging concerns (Quadrant 3). Finally, they can explore and report on the change challenges – Handprint actions – they might undertake to resolve the matters of concern (Quadrant 4).

Teachers are invited to share their experiences with other teachers from their own schools and/or other neighbouring schools and collaborate as a community to develop more teaching practices to support the activation of ethics-led learning around matters of concern including Handprint actions for the common good.

There are four more exemplars available on the www.handprint.in website as additional resources.

Exemplar: **Water**

Puzzling out the quality of rivers and streams

Clean water is crucial to survival and the absence of clean water can greatly impact health, food security and livelihoods across the world. Even today, millions of people have no access to good quality drinking water. Though our planet has been bestowed with clean water, poor management and human actions are often detrimental to water quality. Millions of children die from diseases associated with inadequate water supply and the poor quality of water. In order to meet this global challenge, the SDGs are committed to expanding international capacity and cooperation on water and sanitation programmes.

Linkage to the SDGs

Availability and sustainable management of clean water is the key to SDG 6. Water is also connected to several other SDGs. In this exemplar, we consider SDGs through which we can work with learners to understand key issues related to the quality of water and the human impact on it.

Handprint CARE Pedagogy

Teachers using the Handprint CARE pedagogy could facilitate learning among learners by taking them through experience sharing to inquiring about the issues to critically think about what can be done and then taking actions. The quadrant diagram given below guides' teacher about how this exemplar could be used:

Quadrant 1

Start up stories and Sharing Experiences

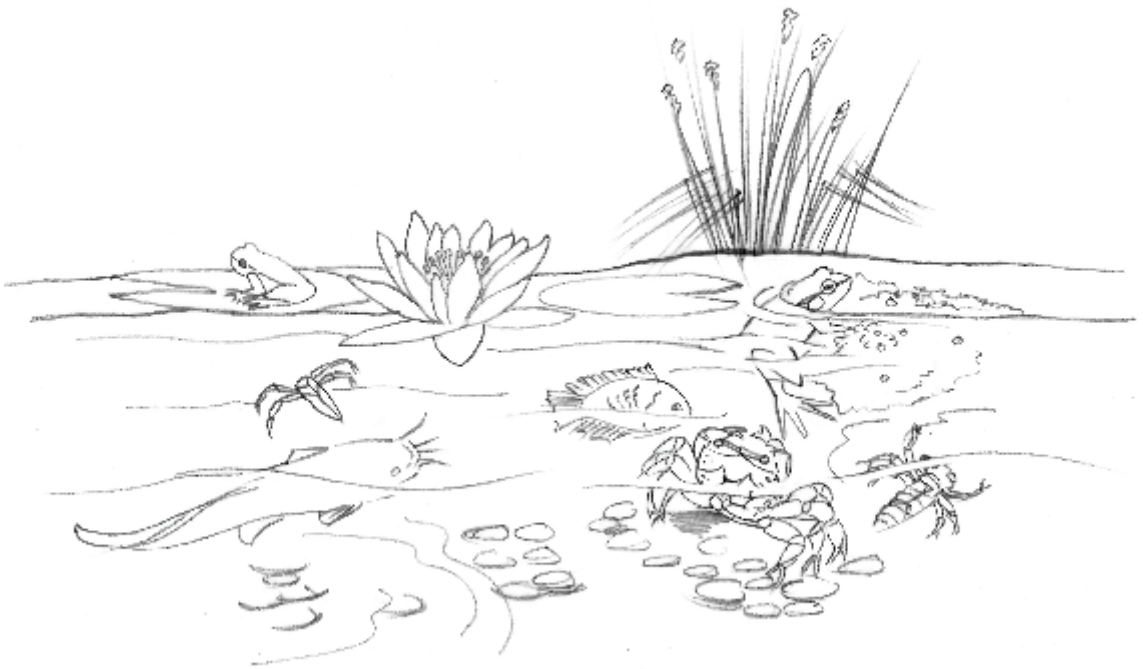
Story 1 - Water Heritage in Villages

People living in rural villages all over the world have been able to 'read the water quality story' in their streams and springs so as to collect clean water for their daily use.

The Nguni people in southern Africa, for example, collected water from a stream where they “could hear the water”. Water that is moving and bubbling over rocks and stones in the stream is more likely to be healthy than stagnant water in a pool When collecting the water they would also sweep the surface water with

their forearm or with the collection pot before lifing the water, 'amanzi mNandi' (sweet water) out of a 'hole' they had cleared in the surface water. This process removes surface bacteria and dust that may be floating on the surface of the water. Women would also carefully clean their water pots, by scrubbing the inside after use, to ensure that the water they collected would not be contaminated.

The isiXhosa people cleared spring water using an ancestral practice of sprinkling wood ash on the surface, particularly during the rainy season when the water became cloudy (turbid). Wood ash is a flocculent that enables small particles of silt to be drawn together and sink to the bottom of a pool. Wood-ash flocculation would clear a pool so that it was possible to collect clear water as well as to see to the bottom of a pool for evidence of healthy organisms living in a village spring.



Story 2 - Youth Enviro-Champs

Nonhlanhla was surprised when the visiting speakers from DUCT (the Duzi uMngeni Conservation Trust) were Sbu and Mdu as they lived in her street. They told her class that sewage had been flowing into Midmar dam from Mpophomeni for more than 20 years. They were also working through DUCT, and the water authorities, to rectify this awful situation. Midmar dam supplies water to Mpophomeni and the cities of Pietermaritzburg and Durban, South Africa's second largest economic hub. Sbu and Mdu had become Enviro-Champs and had were working with Liz Taylor, also from DUCT to detect blocked sewage lines and report these to the water authorities. They also monitored the water quality in the streams that flowed through the village.

After three and a half years of careful pollution monitoring very little had been achieved and there were still regular leaks with sewage flowing into the water. This water had to be purified before people could drink it. It took a number of years of hard work before the sewage flowing into Midmar was noticed and for their reports to be given attention. 2015 was a turning point in their efforts to solve the water pollution challenges. This was the year the Department of Water Services (DWS) began to send in teams to fix the leaks.

Mdu and Sbu had attended a training course on how to monitor water pollution and one of their assignments was to start a Change Project. A Change Project is quite simply a story of a change that someone has undertaken. Whether at home

or at work it is a way of addressing and overcoming a risk the community faces. The goal is therefore to make a change and take action towards more sustainable living.

To start a change project Mdu and Sbu became citizen scientists working with community members to detect leaks and to measure the quality of river water using the tools they had learned to use on the Wildlife and Environments Society of South Africa (WESSA) training course. They were also awarded a certificate for passing the course. The discovered that solving problems and enabling change was not an easy thing to do. They had to learn the science, teach it to others and then work with other Enviro-Champ teams, as well as with the local authorities, to help solve the sewage and other water problems that they had detected.

On their course they learned about the Sustainable Development Goals (SDGs) and they used these as a tool to identify all of the complex parts of the problem that the community would have to solve together. They were proud of their analysis using the SDG Wheel (see diagram below) as a tool for finding out that the Midmar pollution problem was a deep issue that would be quite challenging to resolve.

Description of catchment

The streams from the Mpophomeni township flow under the main road and into Midmar Dam.

What we now know

The sewage problem has many complex elements that need careful measurement, careful thought and concerted action.

Scope of local concerns

Sewage flowing from the manholes into the wetland and streams are affected by, and effect, many of the SDGs (See stars)

Leading questions

Where are the sewage leaks?

What are the main causes?

What can we do together to solve them?

Did You Know?

Creatures that lived before the dinosaurs can tell us how clean our rivers and streams are.

It is surprising that wherever humans live on Earth their local streams have many similar organisms. These include dragonflies, mayflies, beetles and snails. Scientists call these small creatures, which are visible to the naked eye, macro invertebrates. Whether we live in the warm tropics or the colder temperate regions of the world we find these animals in our freshwater streams and rivers. They also occur in the streams in the low-lying areas as well as high up in the mountains.

Scientists have discovered that freshwater life (macro-invertebrates) lived in rivers and streams before the time of the dinosaurs when there was one mega continent on Earth. This was long before life as we know it today, was present on Earth. The first mega-continent was known as *Pangea* and after many millions of years it split up, and the continents drifted apart. These formed other mega-continents like *Gondwanaland* which eventually became the continent of Africa. Interestingly, the small locally adapted water organisms travelled across the continents and became scattered all over the world.

This is an amazing fact! What this means is that any class, in any school anywhere in the world, can read and assess water quality using the organisms that live in their local stream. To help us with this task, scientists have made us a simple dichotomous key so that we can figure out which organisms we are finding and what their sensitivity score is. If we find organisms that are sensitive to pollution, like a stonefly, it tells us that the stream quality is better than in streams where sensitive organisms are no longer found. Scientists call are polluted streams "modified" streams because they have been modified by human activities such as sewage pollution.

Quadrant 2
Enquiry and Deepening Knowledge

Eco Puzzle Activity 1:

Assess a local river using the mini-SASS tool.

The little creatures that live in our rivers and streams can tell us about the water quality. This is because many of them are indicator species and are not tolerant of water pollution. A stonefly, for example, is a sensitive creature. If we find a living stonefly in a stream it is an indication of good quality water. We need simple reference sheets, see below, to help us identify the organisms and work out their sensitivity score.

Divide the class into groups. Let each group study a different part of the river using the miniSASS tool given below and note down the observations and results. You can also download the miniSASS tool, below, and the dichotomous key from the miniSASS website at

SITE INFORMATION TABLE	Date (dd/mm/yr):
River name:	Collectors name:
Site name:	School/organisation:
GPS co-ord Lat(S): Long(E):	Comments/notes: e.g. weather, impacts,
Site description: e.g. downstream of industry	alien plants, level of flow etc
pH: Water temp: Dissolved oxygen:	Water clarity/turbidity: see clarity tube at www.minisass.org

GPS co-ordinates as degrees, minutes, seconds (e.g. 29°30'25" S / 30°45'10" E) **OR** as decimal degrees (e.g. 29.50694°S/30.75277°E). If you don't have a GPS, register to upload your results at **www.minisass.org** , find your site on the map, click to upload your result and it saves the co-ordinates for you!

GROUPS	SENSITIVITY SCORE
Flat worms	3
Worms	2
Leeches	2
Crabs or shrimps	6
Stoneflies	17
Minnow mayflies	5
Other mayflies	11
Damselflies	4
Dragonflies	6
Bugs or beetles	5
Caddisflies (cased & uncased)	9
True flies	2
Snails	4
TOTAL SCORE	
NUMBER OF GROUPS	
AVERAGE SCORE	
Average Score = Total Score ÷ Number of groups	

Scoring

1. On this table circle the sensitivity scores of the identified insects.
2. Add up all of the sensitivity scores.
3. Divide the total of the sensitivity score by the number of groups identified.
4. The result is the average **score**, which can be interpreted into an ecological category below.

Interpretation of the miniSASS score: Although an ideal sample site has rocky, sandy, and vegetation habitats, not all habitats are always present at a site. If your river had no rocky habitats that were sampled, use the **sandy type** category to interpret your scores.

Ecological category (Condition)	Were there rocks where you sampled?	
	Sandy Type	Rocky Type
Unmodified (NATURAL condition)	> 6.9	> 7.9
Largely natural/few modifications (GOOD condition)	5.8 to 6.9	6.8 to 7.9
Moderately modified (FAIR condition)	4.9 to 5.8	6.1 to 6.8
Largely modified (POOR condition)	4.3 to 4.9	5.1 to 6.1
Seriously/critically modified (VERY POOR condition)	< 4.3	< 5.1

For more information or to put your results on the miniSASS map

visit the website www.minisass.org!

THIS CITY WORKS FOR YOU

www.minisass.org RIVER HEALTH

miniSASS

Stream Assessment Scoring System
A community river health monitoring tool

Visit www.minisass.org!

Version 2.0 September 2013

miniSASS can be used to monitor the health of a river and measure the general quality of the water in that river. It uses the composition of macroinvertebrates (small animals) living in rivers and is based on the sensitivity of the various animals to water quality. (note: miniSASS does NOT measure the contamination of the water by bacteria and viruses and thus does not determine if the river water is fit to drink).

Equipment list

- net
- white container / tray / ice-cream box
- pencil
- magnifying glass (optional)
- shoes/gumboots
- Hand wash / soap

How to make your own net

Take any piece of wire, for example an old clothes hanger, and bend it into the shape of a net. Then tie the netting (which can be any porous material) to the wire with a piece of string. Alternatively cut the bottom out of an ice cream container and staple netting to the bottom.
Now you have a net!

Method

The best sites are those with rocks in moving water. Not all sites have rocks (**rocky type** rivers), but may be largely sandy (**sandy type** rivers).

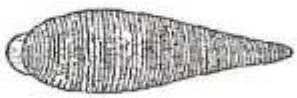
1. Whilst holding a small net in the current, **disturb** the stones, vegetation, sand etc. with your feet or hands.
2. You can also lift stones out of the current and **pick** insects off gently with your fingers or forceps.
3. Do this for about **5 minutes** whilst ranging across the river to **different habitats** (biotopes).
4. Rinse the net and turn the contents into a plastic tray and **identify** each group using the identification guide (see insert: you could start with the dichotomous key and then use the identification guide for more information).
5. **Mark** the identified insects off on the identification guide.
6. Fill in the site information and **Add up** the sensitivity scores to determine the average score (see scoring sheet on back page).
7. Remember to **WASH** your hands when done!

www.minisass.org.

Flat worms

Flat worms are characterised by their flattened shape and soft bodied, worm-like form. They have an arrow-shaped head with two dorsal eyespots and are generally mottled or dark grey in colour. Flatworms move with a gliding action and are generally scavengers or carnivores.

Leeches

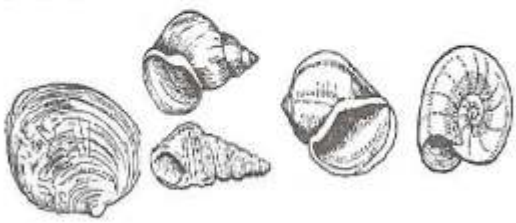


Leeches are segmented organisms that have very flexible bodies. When moving they expand to become long and thin, and then contract to become short and stubby. They have suckers on both ends of the body that are used for feeding and locomotion. Leeches are variable in colour, from grey, to red-brown and black. They swim with a fast, snaking movement and are found under stones, vegetation and debris.

Worms

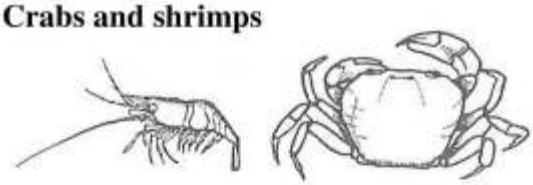
Worms are long and segmented and have a cylindrical shape much like small earth worms. Their colouring is usually pink to brown. They are usually seen writhing around in debris digesting the substrate they fed on.

Snails



Snails are molluscs with hard shells that vary in size, shape and colour. Habitats vary, with some snails such as limpets clinging to rocks, whereas clams and muscles are found in sand. The more common snails move over stones and vegetation. Some snails are host to bilharzia, a serious health hazard for humans.

Crabs and shrimps

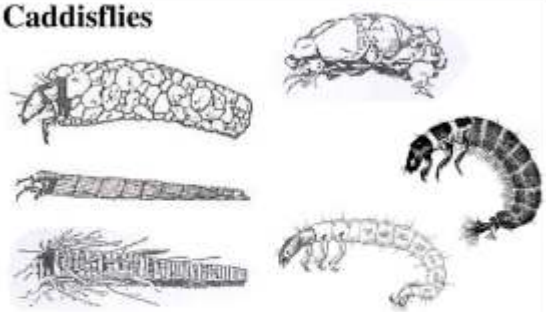


Crabs and shrimp form part of the order Decopoda (ten legs) and have bodies and legs hardened to form a tough shell. They have four or five pairs of legs and eyes that are carried on stalks and are movable. Crabs are scavengers that feed mainly on leaf litter but will feed on animals when given the chance. Shrimps are mostly scavengers or deposit feeders.

Stoneflies

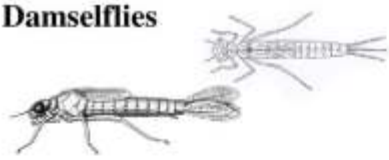
The nymphs of adult stone flies usually have two long tails and three pairs of legs each having two claws at the tip. A characteristic feature of stonefly nymphs are the tufts of gills on the side of the body as well as gills between the two tails. Wing pads on the thorax are often dark and obvious. Some species run across the substrate very efficiently and are potent predators on other invertebrates. Other species are smaller and feed on plant material. Most live in well oxygenated, clean water.

Caddisflies



The aquatic larvae of adult caddisflies have a hard head with three pairs of legs which are attached to an elongated, soft body. Finger-like gills on the abdomen and anal appendages can be seen with the naked eye. Some caddisflies construct portable shelters/cases from sand grains, bits of vegetation and/or silk that are glued together to form a characteristic case shape. Most of the case-building types cannot swim whereas the case-less type swim freely across the substrate. Some feed on algae and detritus whereas others are predators.

Damselflies

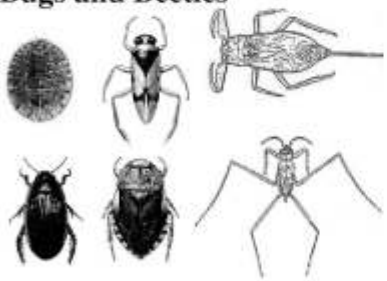


Damselflies have elongated bodies with generally three broad tails/gills on the tip of the abdomen. Damselflies are carnivorous and have a 'mask' over the lower part of the face which hinges out to reveal a pair of pincers with which they catch their prey. They are often to be found in vegetation growing on the edge of rivers.

Dragonflies

Dragonflies are robust creatures that are stout and have a large head and protruding eyes. Some have short legs whilst others have long legs. They do not have tails, but swim using 'jet propulsion' by forcefully ejecting water from the abdomen. Dragonfly nymphs are usually the largest organisms found in a sample and are the most powerful invertebrate predators in the water.

Bugs and Beetles

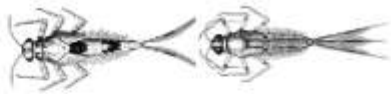


Bugs can be defined as having a piercing and sucking beak for mouthparts, and two pairs of membranous wings. Beetles on the other hand have 'jaws' and outer wings that are hardened to protect the inner wings. Some bugs and beetles are well adapted to swimming, such as water boatmen, backswimmers, pond skaters and water striders. Most bugs and beetles are carnivorous, but some feed on algae.

Mayflies

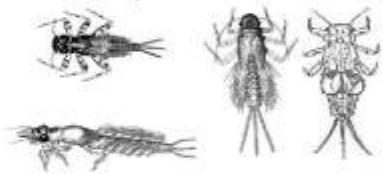
Mayfly nymphs vary greatly in shape and size and live only for a day or two. In this time they will never feed and live to mate and lay eggs in the water. Mayflies fly close to rivers and lakes, usually swarming in the early evenings.

Minnow mayflies



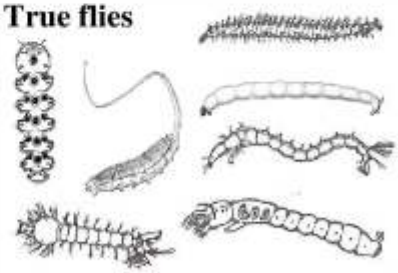
These mayflies have a narrow head and a small, slender, but not flattened body. They have leaf shaped gills on both sides of the abdomen and two but more commonly three tails, depending on the species.

Other mayflies



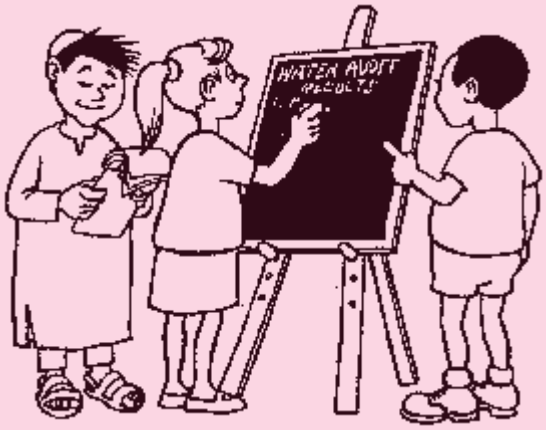
Other mayflies are characterised by an elongated body, large head, well-developed mouthparts and stout legs. They live in a variety of habitats including burrowing in mud, crawling amongst decaying leaves, and scurrying over stones in fast flowing currents.

True flies



Most fly larvae have a fairly indistinct head but elaborate tail ends. They often have small, soft legs (prolegs), segmented bodies and have the appearance of maggots. Some have bristles/ spines and antennae. True flies live in a variety of habitats including sand, mud and stones in fast flowing water. They can either be carnivorous or filter feeders.

Discussion



Let the learners compare their observations and results. Encourage them to briefly describe the quality of the water they studied and how the little organisms (or macroinvertebrates) they found can tell us about the quality of the stream. Teacher can initiate discussions amongst learners on why water from some sources may not be suitable for human consumption.

Eco Puzzle Activity 2:

Assess a dripping tap

Calculate the water wasted each day (24 hours).

- For a slow leak, collect the drips in a small container for a minute. Use a calibrated pipette to calculate millilitres of wasted water collected.
- For fast leaks and running taps, use a bucket to collect the water.
- Use a measuring jug to measure the amount of water lost per minute.
- Find out the cost of water and calculate the savings if 10 dripping taps are repaired.

Calculate:

.....ml x 60 = ... ml hour

(.....ml x 60) 24 = ... litres per day.

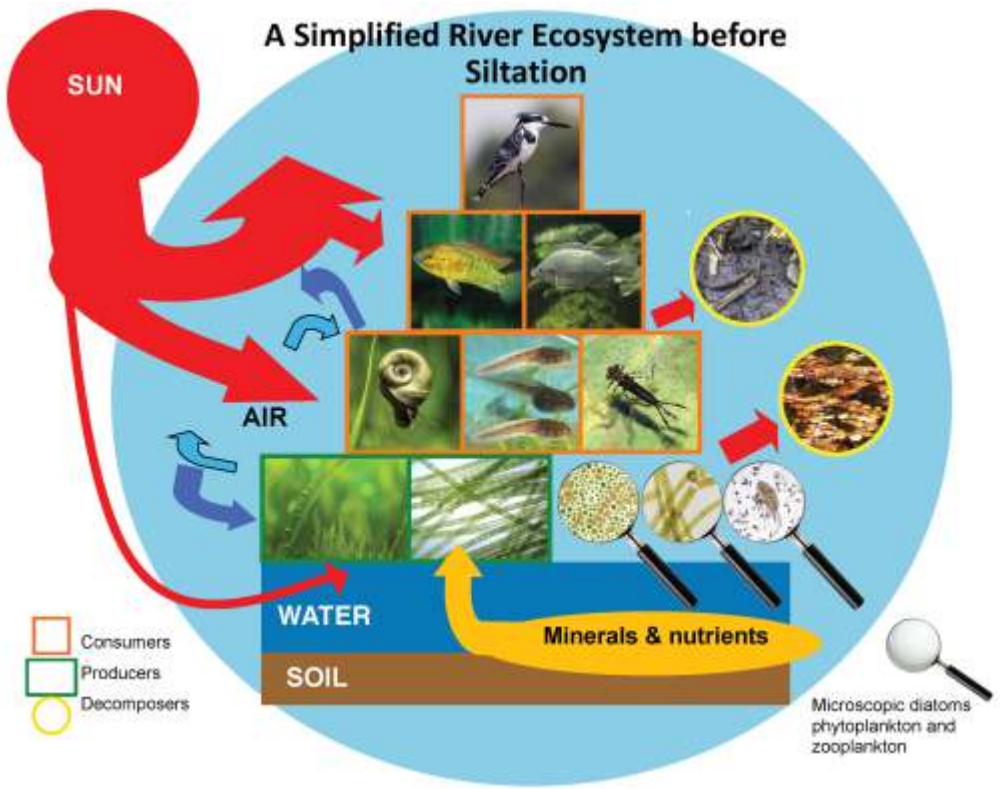
Quadrant 3

Review, Analysis and Critical Thinking

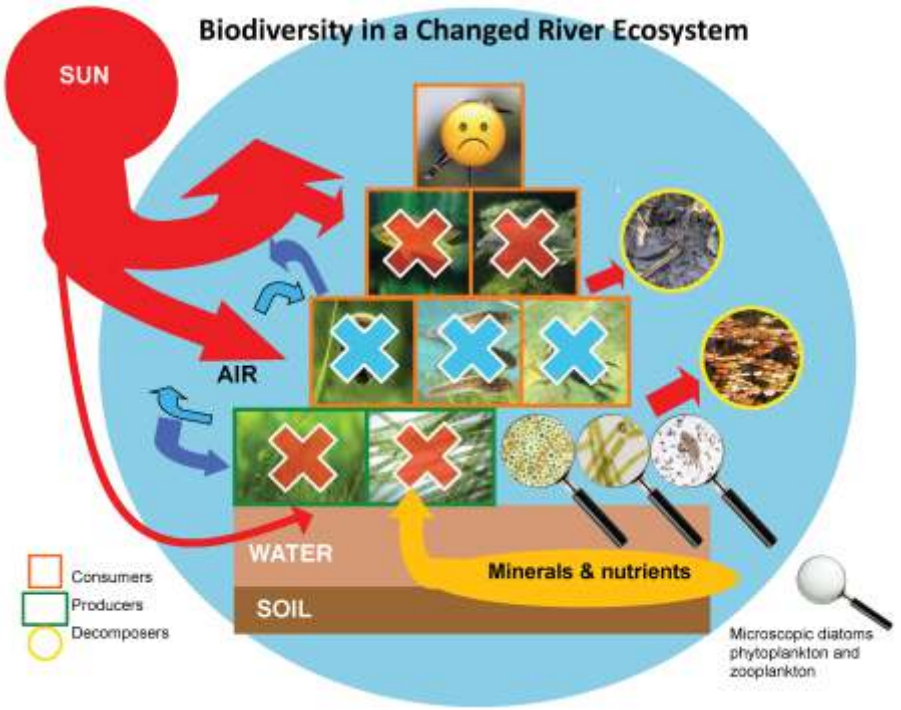
Eco Puzzle Activity:

Puzzling Out Water Quality

An Eco-Puzzle can be used as a model to show how detritus, algae, phytoplankton and zooplankton are food for water organisms which are, in turn, food for a kingfisher. The diagram of river ecosystem shown here tells us how a system functions in nature. Learners can find out how soil erosion and sewage leaks can imbalance the system and prepare a diagram to represent this disturbed system. A sample is given below.



Once learners find out how erosion and sewage leaks can imbalance the river ecosystem, they can represent this in the diagram. A few disturbed connections are already represented in the diagram given below to guide learners.



Discussion

How sewage and erosion affect river life

Soil erosion causes silt in the river, silt blocks the light from passing through the water. This causes the water temperature to change, which is not good for species that need stable temperatures to survive. It also causes problems for hunters like the kingfisher who are not able to see the fish below the water surface, or predatory fish who cannot see their food. It also makes it darker under the surface of the water, which means the plants in the water do not have enough sunlight to photosynthesis. Plants will die because they cannot make enough food to survive. Less plants means less oxygen in the water that all other species rely on to survive.

Quadrant 4

Handprint Actions for Change

What goes down the drain has to end up somewhere….

Record what goes down a household drain.

Assess what goes down the drain over a week.

Describe:
1. What oils and toxins are in the wastewater?
2. What organic matter and solid waste are disposed of?
3. What nutrients (phosphates, nitrogen) will the drain water add to the system?

Action Project: Working out the pollution load on streams and rivers

Suggested Handprint Actions

- Do not dispose of oils in the sink
- Do not empty cleaning chemicals and toxic chemicals in sink
- Do not throw away medicines in the water supply
- Avoid throwing household items in the toilet
- Avoid chemical pesticides in the garden
- Do not litter

Exemplar: **Plastics**

Curse or blessing for humans, animals and the environment?

Plastic – it's everywhere. We all live on a **PLASTIC PLANET**. Plastic use and production have accelerated at breakneck speed, with more than half of all plastics having been manufactured since the year 2000. Plastics have boosted economies worldwide because of their undeniable benefits: The material is cheap, robust, lightweight and easy to make. At the same time plastics have created globally enormous environmental, economic, social, and health problems. In a nutshell: Plastics is a wicked problem that the world has to deal with - complex, tough and persistent.

Linkage to the SDGs

While plastic pollution is connected with one of the targets of SDG 14, the relationship between several SDGs and the need to curb the world-wide plastic pollution is clear. There are at least ten goals connected with issues related to plastic and its impact on the environment and humans. The topic of 'Plastics' touches all dimensions of sustainable development: economic, natural, social, political and cultural. Each of these dimensions is unique but is also connected to the other dimensions.

Handprint CARE pedagogy

Some didactic notes

Teachers using the Handprint CARE pedagogy could facilitate learning among learners by taking them through experience sharing to inquiring about the wicked issue of plastics to critically think about what can be done and then taking actions. Teachers are able to select appropriate knowledge, issues, skills, perspectives and values as attributes which can then be mobilised for working out and reflecting interlinked environmental, social and economic aspects of plastics. They also can encourage students to ask questions, analyse, think critically and make decisions. The exemplar presented here suggests some

Did you know? * (Fuhr/Franklin 2019) **Q1**

- History of the use of plastic
- Why the world is wallowing in waste
- Plastic has benefits – and is for eternity

Did you know? * (Fuhr/Franklin 2019) **Q2**

- Plastic bottles – the child of global trade
- We cannot recycle our way out of the plastic crisis

Did you know? * **Q3**

- Plastic & marine pollution (Fuhr/Franklin 2019)

Additional Material:

- WWF Primary school resources

Additional Material: **Q4**

- Classrooms & schools can start a sustainable movement (Plastic Pollution Coalition 2022)

***Did you know?** Selected thematic background information for multipliers / teachers not for (direct use for the) work with students

Figure 1: Four-quadrant model with thematic background knowledge for teacher trainers (and teachers) and selected hints for in-depth discussions

perspectives for working with the Handprint approach, an illustrative start-up story and possible activities. It is designed for primary schools from grade 4/5 to 6. If students in grades 7/8 want to deal with different impacts of the use of plastic the learning process should be expanded and enriched with in-depth questions, more aspects or a video like that of Eco India (2021).

Selected background material for teachers (see Figure 1, 'Did you know?') are not intended for work with children in grade 4/5 to 6. For reasons of space, the information is not included directly in this example; it can be found in open access publications (see 'References').

Quadrant 1
Start up stories and Sharing Experiences

Story: An engaged beverage retailer

Family Schmidt is sitting at lunch. The two children Jan (6 years) and Marie (10 years) have just come home from school. Marie talks excitedly what happened that day: “We had a visit from a beverage retailer. He told us his story: He has already been trying for two years to counter the one-way plastic mania. However, the industry stood in his way and his family discouraged him. A few weeks ago, he had enough. He posted an open letter on Facebook and announced that he will completely ban disposable plastic bottles from his range. He attacked the big discounters and denounced the behaviour of the consumers. For him the huge use of plastic bottles had nothing to do with environmental protection. 'No, it's about laziness. It has to do with comfort and a lack of responsibility.' The beverage retailer urged his clients to stop this madness.

Jan remarks: “Look, there is also a plastic bottle on our table. We buy it because glass is so heavy to carry.” Marie does not respond to her brother's remark, but goes on: “What happened next was not what the beverage retailer had ever expected. Within a few days, his angry letter was shared more than 3.5 million times. We had an exciting discussion with him. We will continue to talk about the topic. Our teacher told us that she still remembers that when she was a child, her mother always had two plastic bags at the bottom of her shopping bag; they served as an “iron reserve" in case she simply bought more than she had planned".

Marie's father stops eating, and asks: “What do your classmates think about not using disposable plastic bottles anymore?”.

The proposed starting point is a real-world, true story about a German beverage retailer who took all the plastic bottles out of his shop in the summer of 2019. The 41-year-old said: “I'm sick of plastic. I want to promote environmental protection and trigger a big change in my industry.” Since then, he has only sold beverages in glass bottles. The empty bottles are collected, cleaned, refilled, and sold again within a nationwide recycling system. But plastic packaging is often preferred for convenience reasons. The start-up story has a stimulating potential for a dialogic open narrative process and deeper communication among students: The story outlines different dimensions of sustainable development: The beverage retailer raises the question of responsibility, but does not deepen this. He does not provide clear-cut and 'easy' answers but only gives a short hint at positive long-term effects and prevention strategies. This can lead to in-depth discussions among the children about what he might mean by this and why he does not want to use plastic bottles any longer. The students ask questions, share their own (previous) experiences that can be similar or quite different from those of the story, they bring in what they already know about plastics and what role plastic plays in their own lives, what they learned from their families, grandparents. The start-up story invites the students for reflections from different perspectives (beverage shops, customers, environment) and to start consider them in relation with one another.

Quadrant 2
Enquiry and Deepening Knowledge

Sharing stories, questions and perspectives can lead directly to the question of how much plastic packaging can be found in the shops that are part of the students' daily life. Therefore, we propose (as one possible activity) for Q2 an inquiry in selected shops of the municipality / district, exploring whether different shops offer different packaging for drinks – or other foodstuffs (e.g. fruit and vegetables).

The students should increasingly prepare, carry out and evaluate such a study independently – in primary school settings, of course, with the support of the teacher. Whether an online research is useful has to be decided on a case-by-case basis. However, an inquiry based on specific aspects that the students have worked out (as far as possible) independently, is preferable.

As a suggestion, a possible work order is sketched in the box below.

Which grocery stores use plastic packaging?

1. Form small groups and decide which group(s) will visit which shop(s) or drinks departments.
2. Select some products (e.g. drinks, fruit, vegetables, snacks, takeaway food).
3. List which products are offered in plastic packaging. For beverages, check whether the bottle is disposable or reusable.

Back at school:

4. Present your results: Which store uses the most plastic packaging? Are there certain shops that use (significantly) less plastic packaging?
5. Discuss: Why is so much plastic being used in packaging? Include different perspectives in your discussion – the perspective of a business, of people who need drinks every day, lorry drivers carrying all the bottles …

In order to deepen their understanding and knowledge and to answer emerging questions, students can further use different media including online research to understand issues related to plastics at local and/or global level and reflect their findings in the classroom. The teacher should support the students and visualize relationships as well as feedback loops between different aspects. This enables students to work on basic systems thinking skills.

Quadrant 3
Review, Analysis and Critical Thinking

Q2 leads directly to Q3. The inquiry and the discussed results help the students to clarify their formative ideas through mediated conversations. Depending on the specific learning conditions on site, the teacher can facilitate the process by integrating an 'Ethos Hub Debate' (see box below) and/or by using different questions, for instance: Why are plastics used so widely? Why are plastics a threat for life on Earth? Where do plastics in the oceans come from? What are the possible solutions? From this the students become able to design possible solutions for specific plastics related concerns.

Ethos hub Debate: Plastics – boon or bane?

What do you consider more ethical of these two standpoints?

a) Versatility of plastics that has made them central to life-saving initiatives to providing care for those living in extreme conditions. For Example: Bottled water save lives in events of water contamination, plastic syringes save lives when infectious diseases break out. Plastic toiletries can save lives of people affected during natural disasters.

Versus

b) Over-use of plastics has caused marine pollution and is one of the main reasons for the increasing loss of the rich variety of life on Earth.

A global perspective can also be integrated, as such a change of perspective allows students to gain a better understanding of the globally relevant challenge(s). At the same time, a global “we-feeling” can be developed or strengthened. Each trainer and teacher is invited to source and to make choices; as a suggestion, two examples from India and Nigeria are briefly outlined:

- In Assam, India, villagers once burned toxic plastic waste as fuel, but a pioneering education model uses it much more creatively: The Akshar School allows students from low-income families to receive a quality education in

exchange for collecting plastic from their homes and the local area as their 'fee' for tuition. (Source: https://borgenproject.org/akshar-school/ (26/04/2022).

- An interesting story of how people lived in **Nigeria, Africa,** with less plastic in the past and how life has changed since the 1980s. Source: Heinrich Böll Foundation 2021, question 8; https://www.boell.de/en/unpacked-plastic-waste-me (26/04/2022).

Quadrant 4

Handprint Actions for Change

There are a lot of possible Handprint Actions regarding the complex, tough, and persistent plastics. We sketch two possible solution-orientated ideas on how to develop learner-led agency around Handprint action-learning. Planning, realization and reflecting /assessing of Handprint activities create opportunities for students to engage, to develop creative ideas (including the different voices / perspectives of the classroom), to motivate each other, and to experience cognitive and emotional responsibility and self-efficacy. By working out Handprint activities, students experience that they have influence, and can make a difference. These experiences can contribute to a more just and sustainable world.

Suggested Handprint Action 1

How to become a plastic free classroom?

Start a project in the classroom to avoid single-use plastics, reduce waste and maximize recycling: Refuse single-use plastic, Reuse: Choose Reusables, Reduce plastic pollution

Becoming plastic-free is a process that won't happen overnight, so keep in mind some key tips:

1. Start small, perhaps with a Pilot Project, and build on your successes.
2. Educate yourself and others on the harms of plastics: Understand exactly what items contribute to plastic pollution. Many items in your backpack or in the classroom are made of disposable plastic. They include plastic straws, plastic bottles, plastic utensils, plastic cups, plastic wrapping for your sandwiches, and the list goes on. Share what you have learned. A great start is the one-sheet you can distribute or download (Reference at the end of chapter).
3. Collaborate: Get a team together, including students, educators, and administrators. To really address the problem, you'll need peers to help spread the word, teachers to provide help along the way, and campus

administrators that are willing to listen and ready to make policy changes. Think about who you can ask to get support outside the school community?

4. Investigate: Find out how much and what kind of disposable plastic your class uses in a year, a month, or a day. This investigation is the key to change, because it will help focus your efforts on the biggest problems, and you may be surprised by what you find.

5. Make a plan of action: Take on the biggest plastic problem(s), and set a goal for reduction. Define your reduction targets, including a timeline, a strategy for getting the students engaged, and a description of how you'll measure your progress.

(adapted Plastic Pollution Coalition 2022)

Suggested Handprint Action 2

Building up a School Partnership

What about building up a partnership with a school situated in another part of your country or abroad (maybe situated near a beach or ocean) for working on plastic pollution and fair solutions for people and planet?

A partnership with another school offers your class and your school special opportunities for sharing knowledge and experiences. Besides a virtual exchange you can also plan and implement joint activities. For example, you can discuss how to implement plans for a plastic-free class and where you can buy environmentally friendly and reusable materials. Or you can take a class trip together to raise awareness of the dangers of plastic waste on beaches and in the sea.

There are different possibilities how to get in contact with another school.

'Go! Global' is a virtual school exchange programme developed by the ESD Expert Net. The programme facilitates pupils to exchange their practical experience related to the 17 Sustainable Development Goals (SDGs). The

topic waste disposal and recycling is one of the topics that concern everyone – irrespective of their country of origin. Through virtual exchange pupils cannot only explore common ground and differences, but also learn to recognise and analyse global connections, share their experience with each other and gain new thought-provoking impulses for their own behaviour and actions on a local level.

GO! GLOBAL
RECLAIM THE RUBBISH

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Exemplar: **Bees and Pollination**
How bees are critical part of biodiversity?

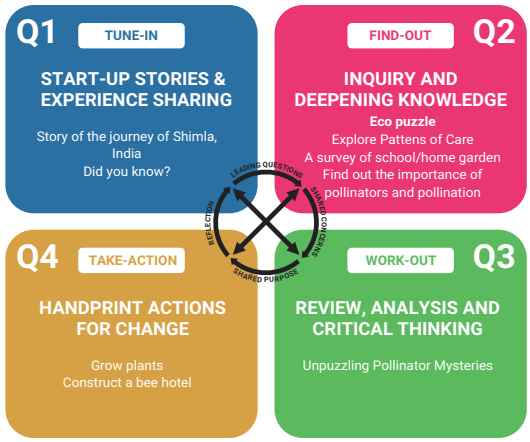
We know that food on the shelves of supermarkets will be close to empty in a few years' time and food prices will soar if pollinators disappear from the face of the earth. It is because of pollination that plants bear fruits and seeds on which we heavily depend as part of our healthy diet. Fruits and seeds are also necessary for the existence of the plants since they grow into new plants. And honeybees are one of the major pollinators besides many other pollinators such as other insects, bats, birds, other animals, air, water, and even sometimes humans as we artificially try to pollinate flowers.

Linkage to SDGs

While none of the 17 SDGs are directly linked to pollination, relationship between the SDGs and the importance of pollination and honey bees are evident. The diagram given here highlights the relationship among several SDGs and pollination. As we learn about the role of honey bees in pollination we will be able to address some of the concerns of SDGs. We shall see in this exemplar how honey bees and pollination are linked with the economic growth of farmers, sustainable production, climate change and the dwindling bee population.

Handprint CARE Pedagogy

Teachers using the Handprint CARE pedagogy could facilitate learning among students by taking them through experience sharing to inquiring about the issues to critically think about what can be done and then taking actions. Below diagram guides teacher about how this exemplar could be used:



Quadrant 1

Start up stories and Sharing Experiences

Story - Journey of the Apple to Shimla, India

It is said that Samuel Evan Stokes, 21, came to India with the intention of working at a home for lepers in the Simla hills. He married a local pahari girl, played an active role in India's freedom struggle and was even jailed by the British. Somewhere along the way, he introduced apple crop to the hills around Shimla[1]. Today, Himachal Pradesh is one of the major apple producers in India. India's share in the total world apple production is 2.05 per cent.

Photo: Akash Saral

Polythene bags on apple trees!

Come apple flowering season, farmers start hanging polythene bags with water and twigs (branches) with flowers from other compatible flowers which are known as pollinizers which will provide pollen. It turns out that the apple tree varieties that are cultivated do not self-fertilize, which means that they need another compatible variety of apple tree for their flowers to be pollinated.

Photo: Kiki Mathawan

With pollinizer twigs on the apple tree, there are higher chances for pollination. Therefore apple farmers cultivate pollinizer varieties so as to increase the chances of apple fruit to set. But even pollinizer varieties are difficult to find since farmers don't want to grow them.

Kids may share their own stories or stories that they have heard of.

Did you know?

During this flowering season bees are also on high demand since there are not enough bees naturally occurring in and around apple orchards. So growers place boxes of honey bees in orchards to speed up the process of pollination. However, bee keepers prefer to keep the beehives in the lower elevation since more nectar is produced compared to when they are fed with apple flowers. In order to tackle the scarcity of bees in the apple orchards, the government provides some facilities where farmers can hire the beehives at lower and affordable rate.

What else has changed?

For good production, appropriate climate is necessary. Flowering season has apparently shortened. Short winters with reduced snowfall, changing temperatures causing decrease in chill accumulation, abrupt rainfall patterns and extreme weather phenomena i.e., hailstorms, droughts, torrential rains, floods, cloudbursts, etc., have been found to have impacted apple production. Apple flowering was previously reported to take place in the month of March-April, but

now this has been observed to have shifted to a month earlier i.e., February-March.

Apple production is more now in higher altitudes where it is colder than in lower altitudes. Sudden drop in temperature, cold and rain along with the use of different kinds of fungicides and insecticides are impacting pollinator population such as honey bees, butterflies, insects, etc.

Coping with adversity

Apple growers have come up with different strategies to overcome the issues that have caused a decline in apple production.

For example, farmers have adapted to hanging pollinizers with flowers on the main apple varieties. They then collect pollen grains from the pollinizers. After some treatment, the pollen grains are applied to the flowers of the main variety. The pollen grains are then transferred by honeybees to other flowers of the apple tree.

To reduce the impact of frost, farmers burn grass in the orchards which raises the temperature by a few degrees. Some farmers also spray pure water at night to avoid frost the following morning. Farmers also spray chemicals to delay flowering by about one week. This will prevent flowering when the temperature is very low. Farmers have also started selling their produce in the local market instead of transporting them to big cities like Delhi. This is more profitable to them.

Story Source: [4] https://hillpost.in/2006/03/how-the-apple-came-to-india/246/)

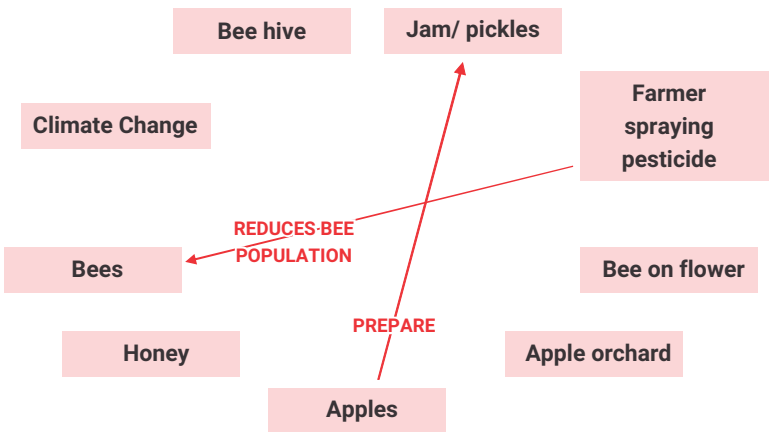
Quadrant 2
Enquiry and Deepening Knowledge

Eco Puzzle Activity 1:

Exploring Patterns of Care

Teachers, after story sharing, can initiate discussion among students. Then the interconnectedness puzzle provided here as a sample could be used to help students deepen their knowledge about this. Students may be asked to use arrows to indicate the interconnectedness among different components related to bees and pollination. They may also be asked to write how they are interconnected. A couple of examples are provided.

Teachers can add more components to this activity as required or adopt to any other example.



Eco Puzzle Activity 2:

A survey of school/ home garden

Students may be asked to do the following activity. They can study their school garden or the garden in their home. They may take up the following tasks:

- How many varieties of flowers do they find there? They may note down the local name if they know or take the help of the teachers or elders.

- How many bees or butterflies do they find there?
- Do they see the bees and butterflies fly from one flower to the other?
- Students may draw a sketch of their school/ home garden.

Eco Puzzle Activity 3:

Exploring the importance of pollinators and pollination

To help understand the importance of pollinators and pollination in their locality/ area, students may be asked to do the following tasks:

- Find out which flowers, fruits or crops majorly depend on pollination by bees in your locality/ area?
- Find out if the number of bees has declined over the years. If so, what is the impact of such decline in bee population?
- Also find out other pollinators in your locality/ area.
- After completing the above task, write a short essay on the role of bees and other pollinators on flower, fruit or crop production.

Note: In order to find out the above, students may speak to gardeners, farmers, researchers, scientists or anybody who has good knowledge about flower, fruit or crop production.

Quadrant 3

Review, Analysis and Critical Thinking

ECO patterns of CARE

Solving Pollinator Mysteries

What are some of the concerns related to bees as pollinators?

- Pesticides and bees don't mix and bees are not doing well in some areas.
- Getting healthy pollinators to a farm is not easy.
- New ways of farming and looking after bees need to be developed.

The 'Mystery Method' presents stories that are complex and difficult to connect. This activity challenges students to connect to the four stories given here that are not easy to resolve.

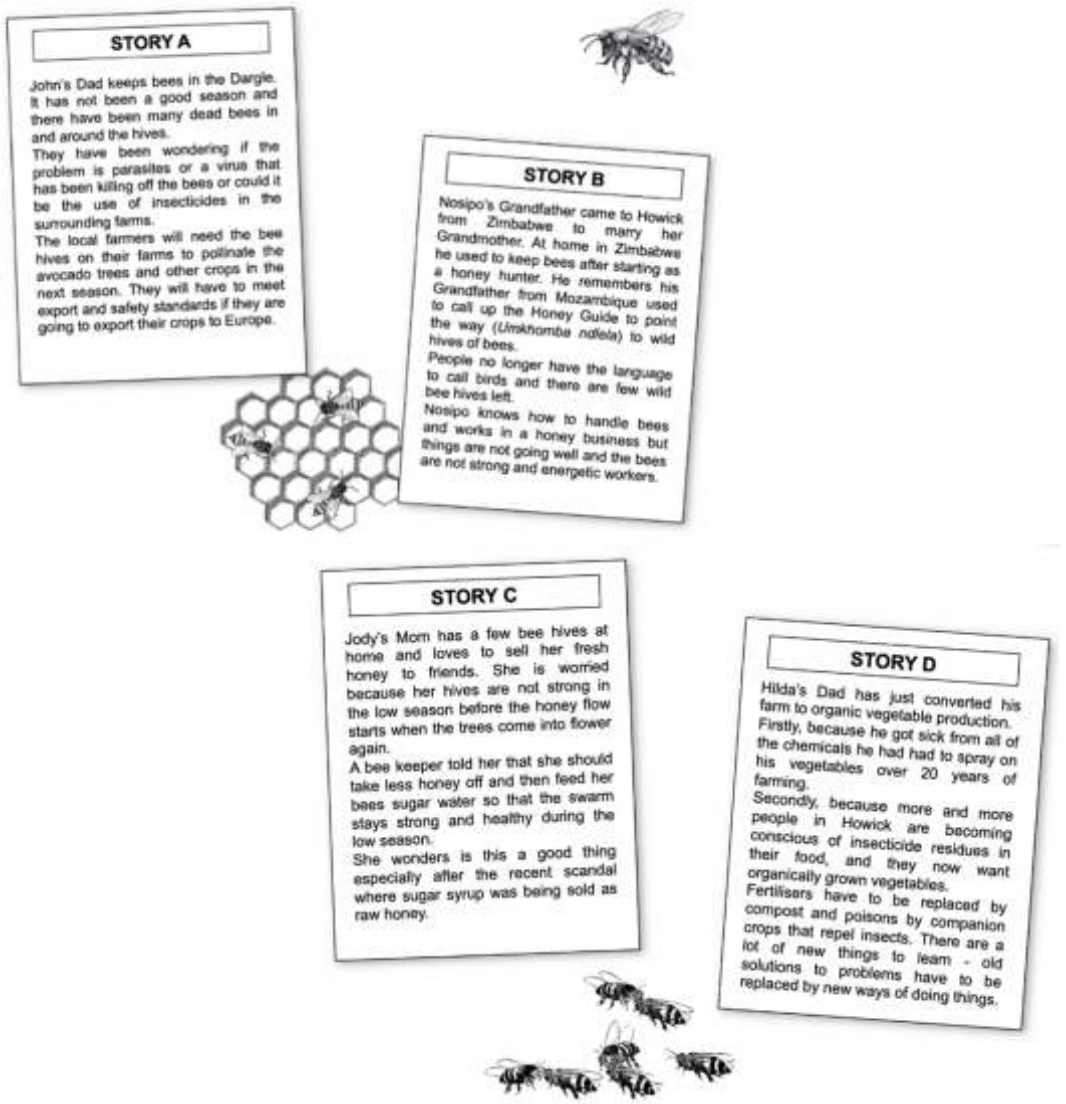
Methodology:

1. Ask students to read the four story cards in groups.
2. Put each of the story cards in a corner on a large chart paper or sheet of blank paper.
3. Ask students to construct a mind map looking at various ways through which these four stories are connected.
4. Once a mind map is done, you may ask students to brainstorm to find solutions to solve the challenges and problems in the 4 story cards.

Mystery Method

To understand the complex structure of multi-interdependent processes and the specific dynamics of any concept related processes, using the mystery method is valuable. This is a learning method, which involves learners to look at 2 to 4 different beginnings of story lines. These stories need to be prepared to make them mysterious and also they need to be completely unconnected. To solve this mystery learners are then asked to

reconstruct the complex narration with the help of information cards, which describe or explain single steps of the whole story. The result of this activity is similar to a concept map. The single cards might not only be arranged in a complex logic, but might also be interconnected with the help of pointing arrows. Doing this, it allows participants to learn to think not only in a linear, but more and more in a systemic way and hence develop and strengthen their individual systems thinking competence.



Source: Schools for Sustainability, A Resource Toolkit for Teacher Training, A Paper by Thomas Hoffman on "Is there a Specific ESD Methodology?"

Quadrant 4

Handprint Actions for Change

Suggested Handprint Actions

1. Grow plants/flowers

Students can grow different plants/flowers in their homes or school to invite pollinators. They can find out the increase in the number of pollinators before and after these plants/ flowers were grown.

2. Construct a bee 'hotel'

Students may construct a bee 'hotel' where bees can come and live.

3. Spread awareness

Students may organize campaign to create awareness about the importance of bees and other pollinators. They can prepare a poster which will make people aware about the importance of bees and pollinators in food production. They can also suggest ways to increase the population of bees and other pollinators.

4. Contribute in policy making

Students may suggest what policies they think the government should up with to increase the population of bees and other pollinators.

Exemplar: **Food and Nutrition**

How do we ensure health and nutritious food for all?

Recent studies have shown that nearly 2 billion people in the world have no access to safe, nutritious and sufficient food. In addition to this, 135 million people suffered from hunger and starvation in 2019. The recent COVID-19 pandemic could put an additional 130 million people at risk of acute hunger. There are many inter-related issues including poverty, lack of empowerment, climate change, economic downturns, man-made conflicts in achieving health and nutritious food for all. Right to healthy and nutritious food is an important part of the human rights. While SDGs and many countries have made right to adequate food as an integral part of their global and national strategies, achieving sustainable food production and meeting the demands of growing population is still a huge challenge. In the midst of all these crises, ensuring 'nutritious food for all' is a tough task.

Linkage to SDGs

Many SDGs are connected to food and nutrition. Nutrition is linked to ending hunger, providing food security and improving nutrition and promoting sustainable agriculture. Through this exemplar, we will understand the how food has evolved over the years across the global and how individual and community action can lead the way to healthy and nutritious food for all.

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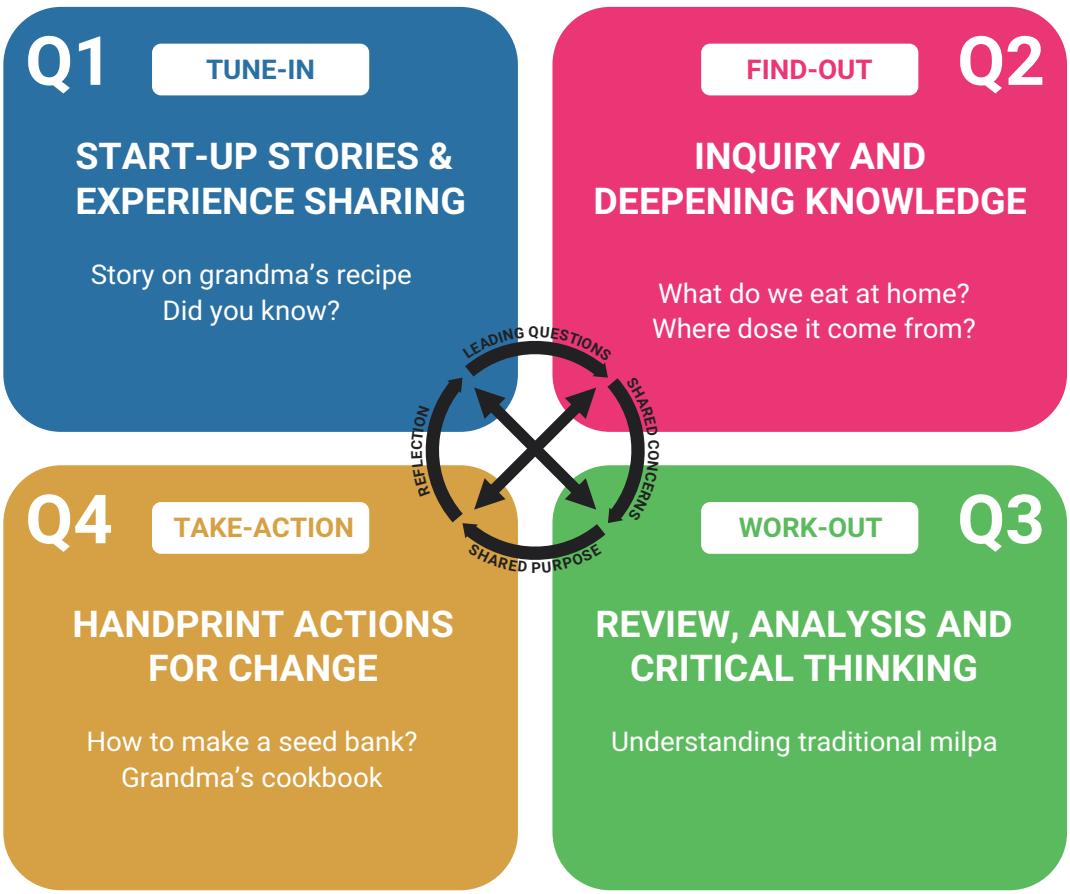

Quadrant 1

Start up stories and Sharing Experiences

Story - Grandma's recipe

The other day when my mother was preparing the food, and while I was helping her, I observed that tears were rolling down her eyes when she was putting the oil in the pan. I asked her if she was sad and she said no, but continued saying that the smell of the oil, tomatoes and the onion being fried in the pan made her remember something. I asked her what it was that she had remembered. She replied that when she was little girl, her mother used to prepare a very rich and nutritious food for her with some plants that she collected on the way that were grown wild in the field. Her mother cooked them with onion and tomato fried in oil and she had not tasted them since she was a child. I again asked why she did not prepare that food if she liked it so much. But she said it was not possible as the plants that her mother gathered from the field were no longer easily found or in some cases they could no longer be found. So I understood why some foods are no longer cooked and why some ingredients stop being used. I am worried that neither I nor my brothers, and perhaps many children my age are no longer able to eat those plants that my mother used to eat which besides being rich and nutritious, were also freely available.

Quadrant 2

Enquiry and Deepening Knowledge

What do we eat at home? Where does it come from?

Teachers can use questions given below as a lead to guide learners in conducting research (online/library/talk to an expert or family members) to find out about link between food, nutrition and traditional knowledge of their own region. Teachers can ask learners to carefully observe their house one whole day to find answers for the following questions

- How is food prepared in my house?
- How did my family prepare it in the past and how do they prepare it nowadays?

If there is a difference in food preparation from the past to now, ask your parents/grandparents why it has changed? What are some of the reasons for this change?

- What ingredients and quantities are used?
- How many different types of foods are prepared in my house?
- What other ingredients / foods is it combined with?
- Where do these ingredients come from or are taken?

Once learners have completed the task, teachers can encourage learners to share their findings in the classroom.

Did you know?

Why traditional food?

There are thousands of crops and foods that have gradually been forgotten or through the centuries. This is very unfortunate, not only because of the spices and flavors that we are losing, but also because of the nutrients they provide and because of the knowledge that is lost around food and the way it is prepared. These crops and foods are often traditional crops that have developed in particular regions of the world. That is, they grow in small or specific geographic areas, have low economic returns, or are susceptible to pests, crops that perhaps never entered the world market and, therefore, many of us are unaware of their existence, sometimes even in our own own regions.

The United Nations Food and Agriculture Organization (FAO)* mentions five reasons why these types of traditional crops must be taken into account as they can revolutionize the future of our food:

1. They enrich our diets. Traditional crops are usually very nutritious and can offer us a more balanced diet. Quinoa, for example, is the only cereal that contains all the amino acids that humans need.

2. They protect our agriculture. Relying on so few crops to feed the majority of the world's population, we are vulnerable to a disease or pest that can destroy much of our food systems. Relying on a greater number of crops valued and appreciated on the world market means

that farmers have more options in choosing their crops and how to intercrop them.

3. They help to fight against climate change. Traditional crops are especially useful as many of them are resistant to the weather, being able, for example, to survive floods or droughts. They can also grow in some types of climates that other "standard" crops cannot.

4. They keep traditional knowledge alive. Indigenous peoples have used numerous agricultural methods such as terrace cultivation that are naturally sustainable. That is, they make better use of water, do not require fertilizers or require a very small amount of these, or help to replenish the soil. Traditional methods of small-scale food production are valuable tools as a strategy for healthy nutrition.

5. They can enhance the livelihoods of small farmers and local producers. Some traditional crops have good commercial potential and could be an excellent cash crop for small farmers or family farmers.

The next time you visit a local market, instead of heading towards the usual fruits and vegetables, look for those that are locally provided and that you didn't know about. You can diversify your diet if you identify nutritious local foods, which are also usually cheaper than those that come from outside. Let's begin to realize what we are missing and begin to value and promote them.

Quadrant 3

Review, Analysis and Critical Thinking

Local knowledge and practices

Teachers can enable a discussion in the classroom around the findings learners have made. Discussions can be around questions like:

- What foods or ingredients are disappearing or not being used which were used earlier?
- Why did some of the food ítems/ingredients disappear?
- How can we recover those plants and foods that our grandparents ate and that we no longer know?

Learners also reflect on

- Were they able to connect their findings with stories and information that they were introduced initially? If yes, what are some connections they identified? If no, what was different from what they have learned earlier in this exemplar.
- What are some things learners can do as an individual and as a collective to bring back some healthy and sustainable practices from the past?

Teachers can ask similar questions to learners in order to gauge how learners recognize issues around them, assess values around such issues and come up with solutions for them.

Quadrant 4
Handprint Actions for Change

Suggested Handprint Actions

1. Make a seed bank

Once learners have understood issues linked to food and nutrition, teachers can now discuss with them what kind of action can be taken in order to conserve and bring back our traditional food practices in our life. Below is the example of creating a seed bank to conserve traditional varieties.

Why to do it?

- Because we know that on our planet, many species are disappearing or being replaced by other genetically modified seeds.
- Because it is we who must have control over what we want or not to consume.
- Because this way we contribute to ensure a healthy diet for the present and the future.
- Because we ensure the local production of healthy foods.

How to do it?

- Extract the seeds of products that we know for sure that are organic, that is to say that they have not been treated with insecticides, chemical fertilizers or genetically modified.

- Choose products that look good, large, with good color, that smell good and taste great.
- The seeds should be removed from their fruit and let them dry well so that they do not rot or germinate.
- Once we make sure they are dry, we must store them in a paper or cloth envelope and label them (put their name, date of packaging and if we know, their origin).
- We will bring them to school and keep them in a dry place with low light.

How to prepare seed bank in schools?

- As a class or as groups, determine a few plants from your garden or fruits/vegetables in your house that you could save seeds from.
- Read up a little bit on what season it is when you are doing this work and see what kind of seeds are best suited for that season.
- You could choose heirloom seeds or open pollinated seeds. (Heirloom seeds are old, historical varieties, which are pollinated with the same variety to keep the seed true to type. Saving seed from your own garden will be open pollinated and likely to have crossed with other similar plants growing in your neighbourhood. Your seeds will adapt to your local climate over time and may perform much better in the garden)
- If you are saving seeds from your garden, carefully remove the seeds and allow them to dry. Once dry, place them in a paper seed envelope and write down what they are and when and from where you collected them.
- Keep your seeds in a dark, cool and dry place.
- Seeds can be placed in paper envelopes, reseal able bags or foil pouches in an old biscuit metal tin.
- Grow your seeds each year to be able to save more seed and ensure there are enough seeds, which will still germinate. Ensure to use the oldest seeds you have stored.
- You can also donate seeds from your seed bank with organizations looking to store seeds, share them with friends, family and other gardeners.

2. Grandmother's cookbook

Interviewing our grandmothers about the foods they used to consume and are no longer consumed now is a very important activity. In the first place, because it brings us closer to a past that we could not know to foresee our future.

Based on the interview of your grandmother or any older person, share recipes that were used to make or eat as a child. Ask ways to prepare and ingredients

used and create a book with the recipes that were shared with you.

Why to do it?

- Because we can know the food that our grandmothers prepared and the ingredients they used
- Because we can compare the diet our grandparents ate with the one we consume today
- Because we can identify ingredients that are not used, that are underused or that are no longer available

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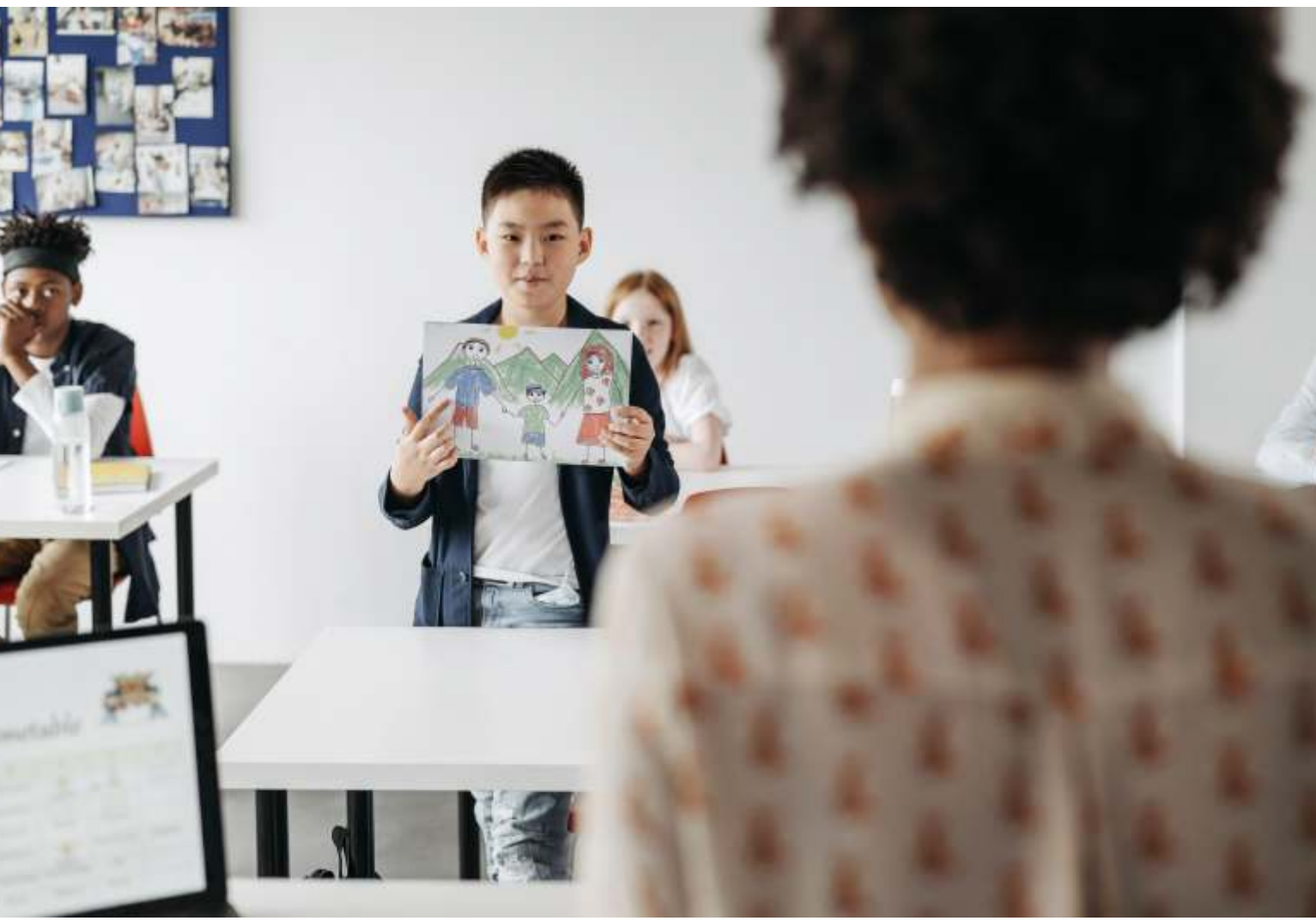

Part III

Picture Story for Storytelling Using *Kamishibai*

Introduction

This part of the handbook explores picture stories as starting points for students to share examples that 'show us the way' to a more just, positive and hopeful future. You could refer to chapter 4 - *Learning with Real-World Stories* to use this part to integrate it in your teaching learning process with students.

An ancient form of storytelling through art/pictures called *Kamishibai,* or paper drama, was famous during the 12th century, in Buddhist temples across Japan. Earlier, monks used *e-maki or picture scrolls* to tell moral stories to people. This traditional form of storytelling evolved over the centuries into the use of beautifully illustrated boards by the Kamishibai storyteller.

In Africa storytelling was an important part of learning, sharing and entertainment between generations. Stories were popular amongst children and these were often interspersed with poetry and song. The stories remain open-ended to invite Handprint learning in action-orientated re-imaginings that can, in the words of African poet and storyteller Gcina Mhlope (2021) *"Touch the past with our memories, (to) feel the future flying on the wings of imagination".* Use of picture stories were also taken up in Mexico by young students and, of course, India also has a tradition of stories that challenge ethical thinking and practices.

Story-sharing work with photo and picture sequences allowed us to identify how images and stories can be at the root of students developing transformative agency through Handprint CARE as an ethics-led learning to change. While developing this handbook, we came to realise that pictures are not only 'worth a thousand words' but they invite students learning school subjects to journey in evaluative story sharing into new worlds of positive future possibilities. These are not only social imaginaries for better futures for people and planet, but futures that their action learning brings into reach.

The two picture story sequences that follow are developed as examples of 'real-life start-up stories.' These stories invite sharing and completion as they are open-ended and incomplete in many ways. Subject teaching work with the picture stories that follow can activate learners to re-imagine how things are and could be. Each of the stories can be used to inspire and activate inquiry and Handprint action learning through which students can compose their own real-life true

stories that 'point the way' (uMkhomba ndlela) to more just and sustainable lifestyles. There are more picture stories available on the www.handprint.in website as additional resources.

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Picture Story: **Healthy Snacks**

What snacks are nice and healthy?

Picture 1

Remember, No junk food or snacks between meals," her mom called out as she drove away after dropping Rachel off to visit her Gran. Rachel loved to visit her Gran as she would be allowed to choose her snack food when her Gran read her a story or when she watched a movie with her Grandad. Rachel knew that sweets, potato crisps and biscuits were junk food but she loved nuts and today she would ask for her current favourite, cashew nuts.

Picture 2

“The cashew tree was brought to India because of its deep root system that hold soil, preventing soil erosion on the coast or on steep slopes around fields and villages to prevent mud slides during the monsoon rains” said her Grandad.

Picture 3

“Elephants loved the fruit so the trees were spread into the wild forests and people began to pick the fruit and dry the seeds as a delicious food.”
“Imagine eating the seeds of a tree that came from the Amazon Jungle for its thick roots and was transported by elephants. You could be eating elephant poo junk food?”
“Ha ha! Grandad, elephant poo is just the seed's fertilizer and cashews are not junk food. They are good for you and they are yummy!” Added Rachel.

Picture 4

"Well, you are right about that Rachel, the cashew is not a junk food but a snack food that is good for you. It only came into world trade when snacking became more popular as people began to watch movies and television. This is where the bad habit of snacking between meals became popular in modern, western countries and the cashew entered world trade. Today Germans are the largest consumers of cashews as a snack food and India is one of the main exporters to Germany." Rachel added, "But we get them in South Africa too."

Picture 5

"Because they have become an expensive snack food, the poorer people of India that used to eat them in their diet, can no longer afford to buy them as most of the crop is exported. This has removed a healthy part of their diets and now their diet is not as nutritious as it used to be" said grandad. "That's not fair. Everyone should have a healthy diet" said Rachel.

"That is why there are fair trade campaigns to make sure that the producers in the developing countries of the world, especially the small plantations do not have their prices pushed down by the bulk-buying supermarkets that want to sell cashews to their customers at low prices." You can look on the packet to see where the cashews you eat come from and look out for the Fair Trade logo so that you know that the producers are getting the best price for the work that they

have done to grow, harvest, shell, clean and roast their cashews." said Grandad.

Picture 6

That's an interesting story Grandad." said Rachel. "But can we open the packet and watch the movie now? "One last puzzle Rachel, "Did you know that the cashew is a climate change crop?"

"I heard on the news that the earth is getting hotter and that we need to use less fossil fuels like coal and oil but what does that have to do with cashews." said Rachel.

"Correct. And because the eastern parts of South Africa are predicted to be getting hotter and wetter, they are now more suitable for growing cashew trees, so there will be no shortage of cashews to snack on while we watch a move on the TV in South Africa", said Grandad. Shall I open the packet while you switch on the TV?"

Questions for classroom discussions

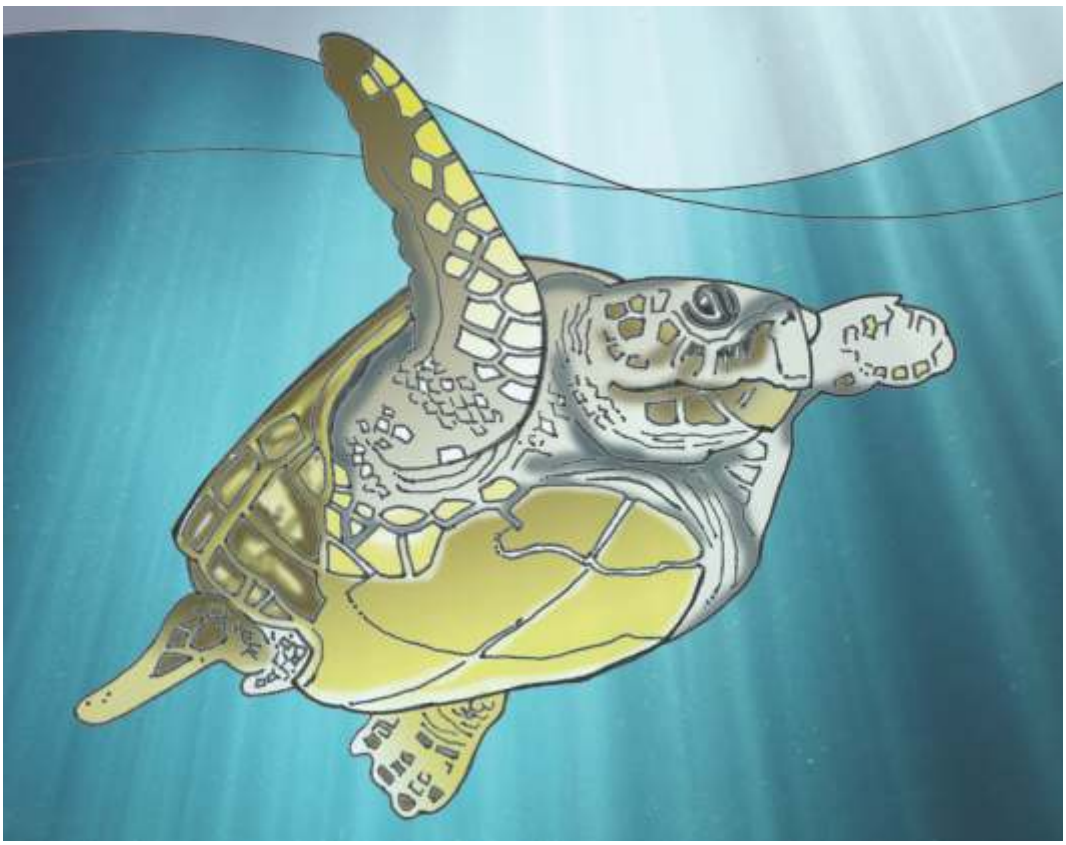
Teachers can ask these questions to students after reading the story, to enable a discussion in the classroom.

1. What did you learn from this story?
2. Ask your grandparents/parents if the concept of snacking existed during their childhood? If yes, what kind of snacks did they eat? If no, ask them what would they do/eat if they got hungry in between meals?
3. List down all what all you eat an entire day and at what time and ask your parents/grandparents at home to describe what they used to eat when they were kids and add it in the table below

Grandparents/Parents diet	Children's diet
Morning During their childhood, at what time did they eat in the morning? What did they eat?	**Morning** At what time did you eat in the morning? What do you eat?
Afternoon During their childhood, at what time did they eat in the afternoon? What did they eat?	**Afternoon** At what time did you eat in the afternoon? What do you eat?
Evening During their childhood, at what time did they eat in the evening? What did they eat?	**Evening** At what time did you eat in the evening? What do you eat?
Night During their childhood, at what time did they eat at night? What did they eat?	**Night** At what time did you eat at night? What do you eat?

4. After completing the table, now compare both diets (parents/grandparents vs yours) and note down what is different about both and which one of the diets seem heathier. Students can share their findings in the class.
5. Based on this activity, ask students what are some dietary changes that they can adopt?

Picture Story: **Turtle Tours**
Tracking the journey of an ocean ambassador



Picture 1

Not so long ago there lived a Loggerhead turtle in the sea off the coast of Durban, KwaZulu-Natal. She spent her days foraging for molluscs on the inshore reefs and floating lazily in the sun-kissed, warm water. At night she slept on the reef floor, or floating on the surface if the sea was calm. One day, she was swept away from her home reef during the storm. She lifted her head above the water to get her bearings but could not see land. She was swimming but something was holding her back. She was trapped. The turtle continued to swim but finally gave up. Luckily, she had been swimming near the surface of the sea so even though she was trapped she could get her head out of the water to breathe.

Picture 2

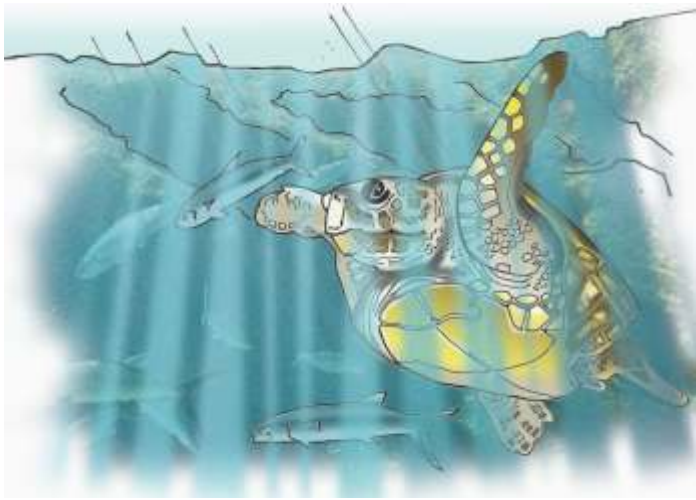
Hours later, she heard a frightening noise. Bongani and Shipo who had been fishing behind the breakers saw something caught in a shark net. Bongani grabbed the net found her entangled in the ropes. They untangled the rope and saved the exhausted turtle.

Picture 3

Sipho and Bongani immediately phoned the Durban Aquarium. Simon, a curator came to collect the turtle. They named her Herbie. Herbie adapted to her foster home quickly and recovered from her ordeal.

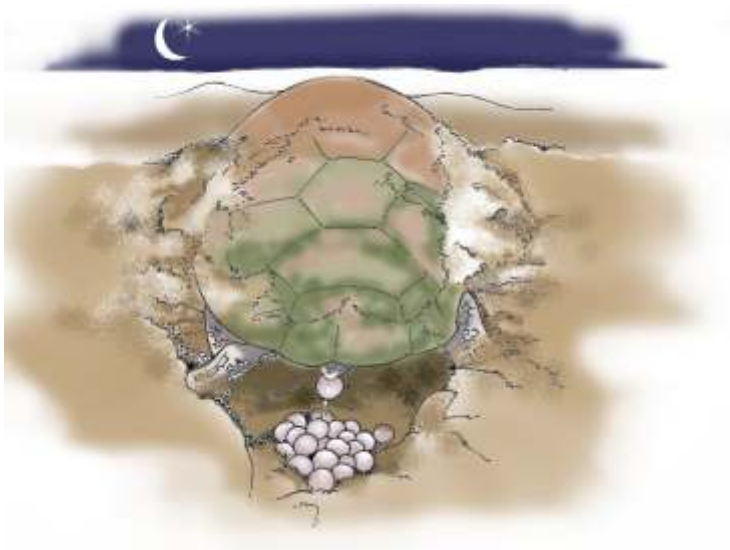
Picture 4

Some years later Herbie moved with the aquarium to her new home at uShaka Sea World, her carers catering to her every need. Over time, she was taught to go to the same spot every day to get food, medicine and to be checked for any parasites or diseases. Herbie was 8 years old when she was rescued from the net. She has been the star attraction at the aquarium for 16 years. Now, she is



25 and her instincts have told her that it's time to nest and lay eggs. She knows that the beach where she hatched is far away and she hasn't come across a mate since she was brought to the aquarium.

Picture 5



One night when the staff and visitors had all gone home, Herbie swam to the beach where her carers come to the water to feed her. She lumbered across the sand. It was the right texture and she carefully digs an egg cavity with her back flippers. When the nest is deep enough, Herbie lays 80 soft shelled, round eggs.

Picture 6

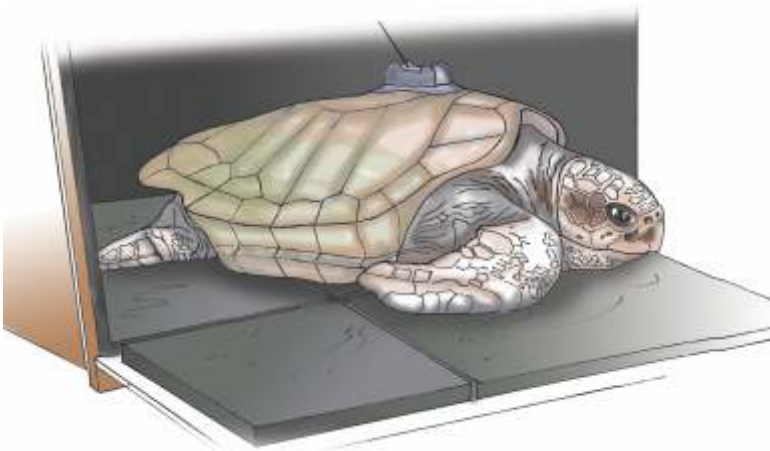
On arriving at the sandy beach at the Turtle Lagoon, Simon notices sand thrown all over the place. What a mess! Was there a group of unruly children using the beach as a sand pit yesterday? How did they get in? He was a little irritated. No! What's that?

Simon knows what turtle tracks look like as he helped to monitor turtles nesting many years ago. Excitedly he phones one of his colleagues on the radio: “Malini! Come in. Can you come to Turtle Lagoon? Out”. Malini was so excited to see that Herbie had laid eggs. This is good news - she is now a mature loggerhead turtle and it's time to think about her release back into the ocean.

Picture 7

Herbie has many friends who come to see her and take photos of their favourite turtle through the aquarium window. Everyone who loves Herbie knows the best thing for her would be to take her back home. Much has been learnt about how to look after turtles in captivity from Herbie. The aquarium has rehabilitated and released at least 200 turtles over the years.

Picture 8



Rehabilitation and release is one of their priorities, especially for endangered animals. One morning, Herbie was suddenly lifted out of the water and placed in a rubber-lined box. She felt cramped, frightened like when she was caught in the net all those years ago. She could breathe but could not escape. The decision was made to release Herbie in the Maputaland Marine Protected Area. A satellite tracking device was attached to Herbie's shell, to be able to check up on her progress. The next 6 hours were noisy, bumpy and very unfamiliar for Herbie. But she trusted these beings, they were kind and had become her family.

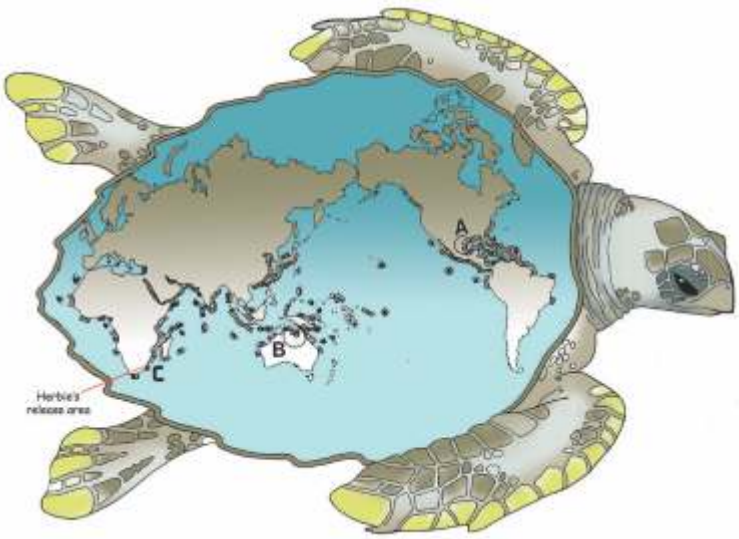
Picture 9

Suddenly the bumping stopped, the box she was in was lifted and put down on the beach. She knew where she was, she wanted to get into that vast watery wilderness... to go home. Her instincts kicked in, Herbie lumbered out of the box and onto the beach heading straight for the water. She did not even look back to say goodbye.

Picture 10

Herbie's satellite tracking device stopped working on the 12th April 2019, she was released in January. We do not know what happened to her satellite tracking device, but a paddle skier did see her south of her last transmission off Kingsburg Beach. She is a truly free turtle now, we hope she will one day be seen nesting on our beaches, identified by the tag in her fin.

Picture 11



How do turtles find their way back home?

Sea turtles' nest in a wide, warm belt around the world. They return to nest on the same beaches where they themselves hatched, and each species of sea turtle has a special place in the world where they nest. For some, only one particular place will do. Kemp's Ridley nests only on one beach on the north-east coast of Mexico (A). The flatback lays its eggs only on the coast of northern Australia (B). Some loggerhead turtles migrate over 3 500 km to nest on the northern Zululand beaches of South Africa (C). They migrate as far as the southern tip of Africa or north to Somalia and the Seychelles. It is a wonder that sea turtles seem to remember where they were born and that they can find these places again.

Questions for classroom discussions

Teachers can ask these questions to students after reading the story, to enable a discussion in the classroom.

1. What did you learn from this story?
2. What do you think are some of the threats faced by sea turtles?
3. What are some of the other things that you have read or heard about sea turtles?
4. Do we think conserving turtles are important? If yes, why?
5. What are some of steps we can take to conserve turtles?
6. Have you been a part of turtle walks or beach clean ups? If yes, share your experiences. If no, will you take part in such conservation actions going forward?
7. What are some steps you will take in order to conserve turtles?

Way Forward

A more sustainable, Handprint way of life?

As a teacher would you like to support your learners to understand the world around them better? And, building on this knowledge, would you like them to start taking actions, no matter how small or local, to make the world a better place? If so, this Handprint resource could be the resource for you!

Inequalities and pressures on the Earth's fragile resources are growing. This handprint resource is all about taking action for sustainability. Furthermore, as we teach, learn and act for social justice and sustainability, we recognise how important we, as teachers are in this work. More than anyone teachers are key for supporting positive, learner-led actions. Through these actions teachers can support and enable more just and sustainable futures for all!

We are happy to have you on board to take up the Handprint approach in teacher education. There are more educational resources available on www.handprint.in for your references to explore for your teacher education programmes or suggest to teachers in your network to use them in primary education settings. We hope you will find this Handbook and all the materials available online useful for your ESD training programmes.

Bringing a positive change

The aim of this resource is to be a practical guide for the educators for the inclusion of ESD in school subject teaching. It is intended to engage learners with the SDGs for course-supported teacher professional development in diverse cultural settings. It is expected that by using Handprint CARE pedagogy you will be able to make your teaching-learning process more inclusive and connected to the local matter of concerns.

Application

This material intends to support you as a teacher trainer in building up several competences for sustainable development (SD) and for guiding the assessment of learning outcomes. Teachers adopting this approach in the classroom with students should be able to bring ethics-led discussion to help them take Handprint action in their own local context. As a result, learners will gain insights

into sustainability concerns, which motivate them to think about solutions and act on them together. Handprint integrates well with a whole school - in - community approach to ESD.

Way from here

We are eager to hear from you about your experiences of using this handbook and other resources. We welcome questions, suggestions and contributions for improving the resource material, especially for its use in your social and cultural context.

We hope you enjoy using these resources in facilitation of the teaching-learning process for encouraging more and more learners to become part of Handprints for change.

You may email us at handprint@ceeindia.org.

Glossary

Action learning

Action learning is a structured method that enables small groups to work regularly and collectively on complicated problems, take action, and learn as individuals and as a team while doing so.

Biodiversiy

The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.

Climate Change

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Constitution of India

It is the longest written constitution of any sovereign nation in the world. It provides a comprehensive framework to guide and govern the country, keeping in view her social, cultural and religious diversity. The original text of the Constitution contained 395 articles in 22 parts and eight schedules. It came into effect on January 26, 1950, the day that India celebrates each year as the Republic Day.

Competencies

Competencies are the positive combination of knowledge, ability and willingness in the availability of the individual to cope successfully and responsibly with changing situations.

Conservation

The protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence.

Consumption
The use of products and services for (domestic) final demand, i.e. for households, government and investments. The consumption of resources can be calculated by attributing the life-cycle-wide resource requirements to those products and services (e.g. by input-output calculation).

Coral reef
A tract of corals growing on a massive, wave-resistant structure and associated sediments, substantially built by skeletons of successive generations of corals and other calcareous reef-biota. Because of the diversity of life found in the habitats created by corals, reefs are often called the "rainforests of the sea." About 25% of the ocean's fish depend on healthy coral reefs.

Cultural heritage
The entire corpus of material signs - either artistic or symbolic - handed on by the past to each culture and, therefore, to the whole of humankind.

COVID-19
Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus.

Critical thinking
Critical thinking is the individual's ability to apply higher-order, rational thinking skills such as analysis, synthesis, problem recognition and problem-solving, inference, and evaluation. Critical thinking is one of the key competences in ESD.

Deforestation
The conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 percent threshold.

Disaster
A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources'.

Ecosystem
A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Eco-tourism

Responsible travel to natural areas that conserves the environment and improves the well-being of local people.

Education for Sustainable Development

It empowers learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity." In simple words, we can also define "ESD" as education to achieve sustainable development.

Environment

All of the external factors, conditions, and influences that affect an organism or a community. Also, everything that surrounds an organism or organisms, including both natural and human-built elements.

Environment Education

It is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.

Equity

Equity is the absence of avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically.

ESD Competencies

The concept of competencies is seen as an essential landmark for orienting teaching and learning for Sustainable Development. Systemic thinking, anticipatory thinking, critical thinking, normative, strategic, collaborative, self-awareness and integrated problem solving are considered key competencies for ESD teaching and learning.

European Union

It is a group of 27 countries in Europe. These countries came together to make things better, easier and safer for people.

Exemplars

A collection of resource materials for common environment and sustainability

topics centred on the primary and middle school but can be adapted for use at any level by teachers given in Part II of this handbook.

Extinction

The evolutionary termination of a species caused by the failure to reproduce and the death of all remaining members of the species; the natural failure to adapt to environmental change.

Flora and Fauna

The community of plants (flora) and animals (fauna) peculiar to a region, area, specified environment or period.

Forest

It is a land area of more than 0.5 ha, with a tree canopy cover of more than 10%, which is not primarily under agricultural or other specific non-forest land use. In the case of young forests or regions where tree growth is climatically suppressed, the trees should be capable of reaching a height of 5 m in situ, and of meeting the canopy cover requirement.

Fossil fuel

A natural fuel such as coal or gas, formed in the geological past from the remains of living organisms, such as plants or animals. The three most important fossil fuels are coal, petroleum, and natural gas.

Freshwater

Water that contains less than 1,000 milligrams per liter (mg/L) of dissolved solids; generally, more than 500 mg/L of dissolved solids is undesirable for drinking and many industrial uses.

Gender equality

The understanding that women and men have equal conditions for realizing their full human rights and for contributing to, and benefiting from, economic, social, cultural and political development.

Global warming

Global warming is the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.

Greenhouse gas

Gases in Earth's atmosphere that trap heat. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere. The main greenhouse gases are: Water vapor, Carbon dioxide, Methane, Ozone, Nitrous oxide and Chlorofluorocarbons. Human activities are changing Earth's natural greenhouse effect. Burning fossil fuels like coal and oil puts more carbon dioxide into our atmosphere. Too much of these greenhouse gases can cause Earth's atmosphere to trap more and more heat. This causes Earth to warm up.

Habitat

A place or type of site where an organism or population naturally occurs.

Handprint

Measure of the good act we do for the environment.

Hygiene

Hygiene refers to behaviors that can improve cleanliness and lead to good health, such as frequent hand washing, face washing, and bathing with soap and water.

Kamishibai

An ancient form of storytelling using pictures used in Buddhist temples across Japan during the 12th century.

Literacy

The ability to identify, understand, interpret, communicate and compute, using printed and written materials associated with varying contexts. It involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community.

Malnutrition

Deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. Malnutrition, in all its forms, includes undernutrition (wasting, stunting, underweight), inadequate vitamins or minerals, overweight, obesity, and resulting diet-related non-communicable diseases.

Marine ecosystem

A complex of habitats defined by the wide range of physical, chemical, and geological variations that are found in the sea. Habitats range from highly productive near-shore regions to the deep-sea floor inhabited only by highly specialized organisms.

Marine pollution

It refers to the pollution refers to direct or indirect introduction by humans of substances or energy into the marine environment (including estuaries), resulting in harm to living resources, hazards to human health, hindrances to marine activities including fishing, impairment of the quality of sea water and reduction of amenities.

Millennium Development Goals

In 2000, 189 nations made a promise to free people from extreme poverty and multiple deprivations. This pledge became the eight Millennium Development Goals to be achieved by 2015. In September 2010, the world recommitted itself to accelerate progress towards these goals.

Mini-SASS

It is a simple tool which can be used by anyone to monitor the health of a river. You collect a sample of macroinvertebrates (small animals) from the water, and depending on which groups are found, you have a measure of the general river health and water quality in that river.

Natural resources

Natural assets (raw materials) occurring in nature that can be used for economic production or consumption.

Nixtamalization

Nixtamalization is a traditional process in Mexico and Central America whereby corn is treated with lime, cooked, and dried and ground to produce the flour used to make tortilla.

Non-violence

The principle of non-violence also known as non-violent resistance rejects the use of physical violence in order to achieve social or political change.

Nutrition

Nutrition is a critical part of health and development. Better nutrition is related to improved infant, child and maternal health, stronger immune systems, safer pregnancy and childbirth, lower risk of non-communicable diseases (such as diabetes and cardiovascular disease), and longevity.

Pedagogy

It is the mode of delivery of the curriculum.

Picture Stories
A set of stories with pictures in the handbook that 'shows us the way' to more just, positive and hopeful futures.

Poaching
Illegal hunting.

Pollination
Pollination occurs when the transfer of pollen (male) from the anther of a flower to a stigma (female) by wind or animals, which results in fertilization which produces seeds and, in some cases, fruits. Pollination is an important input in the production of the marketable goods of many crops and can have a substantial impact on production.

Pollution
Presence of substances and heat in the environment (air, water, land) whose nature, location, or quantity produces undesirable environmental effects.

Poverty
Fundamentally, poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and cloth[e] a family, not having a school or clinic to go to, not having the land on which to grow one's food or a job to earn one's living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation.

Recycling
The reprocessing of materials into new products, which generally prevents the waste of potentially useful materials, reduces the consumption of raw materials, lowers energy usage, and decreases greenhouse gas emissions compared to virgin production.

Restoration
All of the key ecological processes and functions are re-established and all of the original biodiversity is re-established.

Sanitation

Sanitation refers to the provision of facilities and services for the safe management of human excreta from the toilet to containment and storage and treatment onsite or conveyance, treatment and eventual safe end use or disposal. More broadly sanitation also includes the safe management of solid waste and animal waste.

Scutes

A scute is a large epidermal scale or plate found on turtles and other reptiles.

Seed bank

A facility designed for the ex situ conservation of individual plant varieties through seed preservation and storage.

Single-use plastics

Single-use plastics are goods that are made primarily from fossil fuel–based chemicals (petrochemicals) and are meant to be disposed of right after use—often, in mere minutes. Single-use plastics are most commonly used for packaging and service ware, such as bottles, wrappers, straws, and bags.

Sustainable use

The use of an organism, ecosystem or any other renewable resource at a rate within the bounds of its capacity for renewable.

Sustainability

It implies continuity, able to last or continue for a long time, something that can be replenished and continue without artificial inputs.

Sustainable Consumption

The use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations.

Sustainable Development

Is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Development Goals

The Sustainable Development Goals (SDGs), otherwise known as the Global Goals, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The SDGs are made up of 17 goals and 169 targets.

Solar energy

Solar energy is any type of energy generated by the sun. Solar energy is created by nuclear fusion that takes place in the sun. Solar energy can be harnessed directly or indirectly for human use. These solar panels, mounted on rooftops harvest solar energy and convert it to electricity.

Storytelling

Is the verbal exchange of stories by a narrator or storyteller delivered to an audience. A person who has valuable knowledge tells stories of his/her experience in front of people who want to gain knowledge.

Tourism

Activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited.

Urbanisation

Urbanisation is a process that occurs in response to the growth and development of the municipality, being an economic and demographic product that has the possibility of transforming the rural to urban lifestyle and through the transformation of urban infrastructure. Urbanisation is rampant energy changes, such as energy changes, water crises, heat waves and contribution to climate change, and so on from a plan of action that can be a good quality of life for the population, in addition to promote sustainable development.

Water quality

A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Wetland

Areas that are inundated by surface or ground water with frequency sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth or reproduction.