

# CHAPTER 6: ASSESSMENT AND ESD – WHICH WAY FORWARD?

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## **Abstract**

The objectives of a learning activity can be categorised into three domains (also referred to as the 3Hs): the HEAD (the cognitive processes), the HEART (the affective reactions), and the HANDS (the psychomotor skills). How do we get feedback about learning? This is particularly relevant for Education for Sustainable Development (ESD) and its transformative agenda. To answer this question, we need a good knowledge about the assessment OF, FOR and AS learning. On considering the theoretical frameworks for the assessment of learning, it can be seen that the recommendations are grounded in research about effective learning and the factors that help learners' motivation and self-esteem.

A study by Loughland et al. (2003) indicated that students tend to have either an 'object' perspective or a 'relation' perspective on the environment. In the former the focus is on the environment as a place that contains living things and people. In the relational perspective the focus is on the mutually sustaining relationship between people and the environment. It is normally the case that participants considered in such studies are positioned somewhere along a continuum with the two perspectives at either end. When adopting an ESD task for assessment purposes it would be useful if it was used to help the teacher identify how well the participants had understood the content presented. This can be done through tasks that involve activities such as information processing, evaluation, critical thinking, problem solving, reasoning and communication. Furthermore, it would be beneficial if the assessment also determined where the participants stood on the continuum.

This chapter will discuss how assessment tasks can be designed to help place participants somewhere along the continuum and, in an ESD course, one can think of practices that will prompt participants to look at the environment in a more relational manner, which is more holistic and meaningful.

## **Introduction**

In an effort to provide a holistic, integrated and experiential learning experience, teaching (according to Pestalozzi) should be a unity of the cognitive, affective and psychomotor domains (Gazibara, 2013). Learning objectives can thus be classified into these three domains:

1. The cognitive domain (the HEAD) deals with the cognitive processes that enable an individual to process information in a meaningful way. It focuses mainly on intellectual skills and is the core domain as the other two domains require some form of cognitive thinking.
2. The affective domain (the HEART) concerns attitudes and feelings that spark off motivation, develop values, and generate a willingness to act.
3. The psychomotor domain (the HANDS) involves skills and deals mainly with performing motor activities that are often described as 'hands-on learning.'

While learning can address any one or more domains concurrently (see Figure 13), researchers (like Bruner, 1996) have stressed that quality education and successful education reforms can be achieved by addressing the learner as a complete human being who functions holistically. This implies learning experiences that integrate all the three domains and adopt different styles, strategies and methods to address different learning needs and different learning contexts.

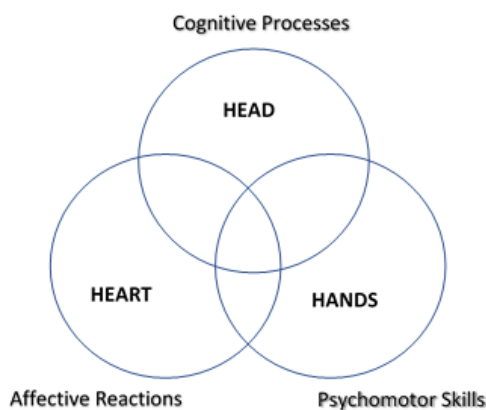


Figure 13: The three domains of learning

Table 13: gives an outline of learning outcomes associated with each of the three domains.

Cognitive domain	Affective domain	Psychomotor domain
Remembering / Recalling	Awareness	Observation / Perception
Understanding	Responding	Guided response
Applying	Valuing	Imitation
Analysing	Organising	Practice / Habit
Evaluating	Conceptualising	Adaptation
Synthesis	Integrating / Internalising	Organisation

Ensuring that educational processes provide experiences that integrate these domains is essential for Education for Sustainable Development (Taimur & Sattar, 2019). Issues related to sustainability are complex involving a multitude of interrelated environmental, social, cultural, economic, and political factors. Finding a plausible resolution to these issues requires an educational process that is coordinated, systemic, collaborative and inclusive. These are the goals of ESD, i.e. a process that empowers learners to become change agents by equipping them with the knowledge, skills, values, and attitudes necessary to become change agents that are critical of current and capable of transforming society (UNESCO 2017). Consequently, the role of assessment in determining the effectiveness of teaching/learning experiences.

### Types of assessment

In the classroom, learning is mostly formal, with the main emphasis on the cognitive domain, through teacher-centred learning. The main components at play are content knowledge, students’ conceptions and their prior knowledge. Within this framework it is extremely important to consider how to get feedback about learning through assessment, of which there are the following modes:

**Assessment of Learning (AoL)** reveals what students know, understand and can do. This may then be used for formal certification and to report on levels of progress to parents, apart from judging the teacher and the school’s effectiveness.

**Assessment for Learning** (AfL) also reveals what students know, understand and can do. The process includes the students. It enables the teacher to plan how to help the students progress and develop their understanding and skills.

**Assessment as Learning** (AaL) enables both the teacher and the students to evaluate the students' understanding of content knowledge through the feedback obtained. Teachers and students monitor the learning, ask questions and use a range of strategies to decide what they know and can do, and how to use the assessment information for new learning.

Considering the theoretical frameworks for AfL, evidence generated by various studies shows that assessment can help teachers to interact more effectively with students on a day-to-day basis, promoting their learning as part of the assessment process. AfL includes any form of assessment in which the first priority in its design and practice is to serve the purpose of promoting students' learning. It should provide information which can be used as feedback by both teachers and students in self-assessment, in order to modify their respective teaching and learning activities. It becomes formative assessment when the evidence is actually used to adapt the teaching to meet learning needs. Such recommendations are grounded in the findings from many decades of research into effective learning and the factors that help build the motivation and self-esteem of learners (Black & Harrison 2004; Black & Wiliam 1998a; Black & Wiliam 1998b; Black et al. 2002; Black et al. 2003; Millar & Osborne 1998; Wiliam 2011).

Teachers are always under pressure to improve their work, to raise their standards and to improve students' test scores and grades. Such pressures may amount to a push to '*try harder*' at the expense of interacting more effectively with students in their learning – which should ultimately be the specific intent for the improvement of education. Research clearly shows that formative assessment can raise the standards of student achievement with significant gains in test performances registered being (Black & Harrison 2001a; Black & Harrison 2001b; Dweck 2016; Isaacs et al. 2013; Wiliam 2011).

The content knowledge of lessons is ultimately determined by national curriculum schemes and by examination syllabi. Infusing ESD within curriculum subjects provides the means by which learners can interact with the world around them and develop ideas about the phenomena they experience. These experiences equip learners with the means to observe and question what is happening, and to work out and predict what might happen if conditions change. In order to be able to learn in this way, students need help in developing processes and values, investigative skills and communication skills to question and discuss findings. Formative assessment fits very well into this learning scenario.

At specific times, learners also have to prepare for examinations. There has to be time set aside near the end of courses for 'examination techniques.' Feedback, peer-assessment and self-assessment all have important roles in this process. When utilised properly, formative assessment can result in large learning gains. It is worthwhile considering the potential of ICT with the many good resources available. It allows time to focus on thinking and provides diagnostic assessment that supports learners and teachers in deciding the next steps in learning (Black & Harrison 2001a; Black & Harrison 2001b).

### ***Principles of learning***

Formative assessment is dependent on a free flow of feedback from student to teacher and from teacher to student. In the promotion of classroom dialogue, the teacher can make the initial step by formulating questions to help students put 'on the table' their ideas. Learning should start from where the learner is. Students have to be active in reconstructing their ideas, and not merely add a further 'layer' of new ideas, which leads to poor understanding, if not confusion. Teachers should fashion their interventions to encourage and listen carefully to a range of student responses – whether correct or incorrect – and invite students to talk through inconsistencies and respond to challenges.



Learning is ensured if students are active in the process – learning has to be done **by** them rather than **for** them. Hence it is important that students understand the learning target, what would count as a good quality piece of work, and have a clear idea of where they stand in relation to the target. Students need to achieve metacognition, i.e. the power to oversee and steer their own learning in the right direction, and take responsibility for it. Collaborative learning, peer-assessment and self-assessment are essential as they promote active involvement and provide opportunities for practice in making judgements about the quality of work (their own and their fellow students'). Another principle of learning can be subsumed under 'talking the talk', i.e. in this particular case, when students are talking about ESD, they have to use the language of ESD (Black & Harrison 2001b; Wiliam 2011).

### ***Learning strategies***

Some strategies to support all learners involve formative questions used in order to collect evidence of the students' understanding (not only what they know, but also what they partly know and do not know), to guide them to upgrading their 'part-knowledge' to a fuller understanding, and to provide sufficient time for them to find answers to demanding questions. To engage more learners in giving answers, a number of techniques have been developed, such as: jotting down 'an answer' (on mini whiteboards or a piece of paper); a 'no hands up' strategy where everyone is expected to answer; and the use of red and green 'cards' as they listen to their peers' answers, enabling them to complete their own thinking.

Discussion provides the opportunity to bring learners' own ideas and thoughts to the surface, where the teacher acts as facilitator. Questions can be used to encourage learners to reflect both on what they think and on what they have heard from others, which helps in shaping understanding, attitudes and values. During such an activity it is important to sort out wrong ideas and to be 'patient' and wait for the various ideas and thoughts to be revealed, before correcting and curbing the direction of the discussion; the facilitator should not intervene too soon.

### ***Giving Feedback***

Feedback is a very important factor in developing motivation and self-esteem of students. Feedback in traditional educational settings tends to categorise students as "good or bad achievers" based on judgement through marks, grades, ranking lists, etc. This form of feedback develops ego-involvement, may have negative effects, discourages low-achievers and makes high-achievers avoid tasks if they do not see 'success'. An alternative form of feedback does not focus on the person, but on the strengths and weaknesses of the given piece of work, and what needs to be done to improve it. This helps develop task-involvement, has positive effects and encourages students to see that they can do better by trying, and that they can learn from mistakes and failures.

Formative assessment focuses on feedback as an activity that helps learning because it provides information for teachers and students to assess themselves and to modify the teaching and learning in which they are engaged. Effective feedback needs to arise from learning experiences that provide rich evidence, so that judgements about the next step in learning can be made. There are a number of ways in which this can be done that are in line with the goals of ESD: challenging activities that promote thinking and discussion; thought-provoking questions; issue-based and problem solving tasks; strategies to support learners in revealing their ideas; opportunities for peer discussion about ideas; and group or whole-class discussions which encourage open dialogue (Black & Wiliam 1998b; Black & Harrison 2004; Wiliam 2011).

Oral or written teacher feedback is an essential part of assessment for learning. Effective feedback should help learners to realize where they are in the learning process and where they should go next: the focus is on improvement. Comments given should be 'useful' and 'effective.' It should be noted that it is difficult to write comments – or there is little to comment upon – regarding 'simple' tasks, where self-checking does not need any teacher expertise. Students should be directed where to go for help, and what they should do to improve. The improving classroom is one where feedback drives formative action, where there is a culture of success that supports and encourages

learners. There must be a clear understanding of what is wrong, of appropriate targets, and of the means for achieving those targets in the short term.

Students need to be able to self-assess – which is not a simple task – and students need to have a clear picture of targets that would allow them to become more committed and effective learners. Peer-assessments help students develop their self-assessment skills. Students can look at some samples of work, reach judgements about levels and give guidance about the next steps. It should be emphasized that the use of investigative work involves individual and collective planning, observing, measuring, analysing and evaluating, as well as general skills such as decision-making and communicating findings. Once again these are essential features of any educational process purporting to promote ESD.

The following factors should also be considered. Items from summative tests can be fruitfully used as tools employed formatively in the classroom. The teacher can deal with serious gaps in understanding, while smaller gaps can be closed through peer activity. The pace and content of teaching should be matched to the students' needs, which leads to better learning. It is imperative to keep in mind that evaluation is a vital part of any plan, and can be done through activities such as mutual observation, sharing of ideas and resources, and dissemination (Black & Wiliam 1998b; Black & Harrison 2004; Wiliam 2011; Isaacs et al. 2013).

### ***Assessment and pedagogy – what connections?***

Any discussion on assessment cannot be done in isolation from the learning context. What leads to assessment is the presupposition that learning has occurred and it is normally the case that this learning was prompted by teaching. The art and science of teaching, commonly referred to as pedagogy, is an academic discipline that involves the study of how knowledge and skills are exchanged in an educational context. Pedagogy also considers the interactions that take place during learning. Pedagogy in the formal setting of the school is focused mostly on the cognitive side of learning.

Yet learning in the context of ESD requires a widening of this view of pedagogy so that it includes not only the learning of concepts, but also the internalisation of values following the learning process. Consequently, a more appropriate term that can be used to describe this shift in pedagogy in a more complete manner is the term Transformative Pedagogy. As stated in a previous chapter, this pedagogy encourages teachers to consider a fusion of constructivist pedagogy with critical pedagogy.

Transformative pedagogy can be defined as an activist pedagogy that empowers students to critically examine their beliefs, values, and knowledge with the goal of developing a reflective knowledge base, an appreciation of multiple perspectives, and a sense of critical consciousness and agency (Ukpokodu, 2009). Any ESD activity may involve communication, creative thinking, enquiry, evaluation, information processing, problem-solving and reasoning, but it needs to consistently encourage critical thinking, the individual's understanding of 'choice and consequence' and the internalisation of values.

Designing activities that include some or most of the tasks mentioned is commendable and essential. Yet considering critical thinking, the concept of 'choice and consequence' and the exposure to a value system prompts the question: How can one assess the learning involved in such a context? or more directly: How can one assess an ESD activity so that the educator gets useful feedback about the learning that has occurred?



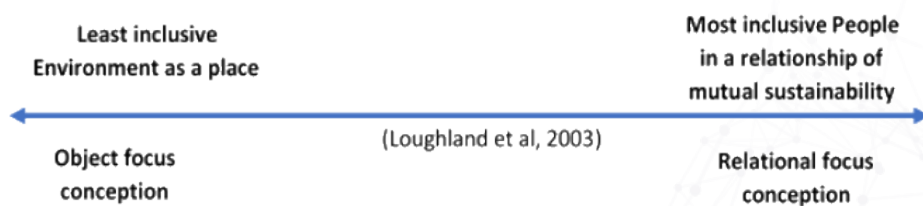
A good starting point to refer to when considering assessment in ESD can be inferred from a research study (Killingsworth & Palmer, 1992) linked to children’s conceptions of the environment. This study revealed the learners’ conceptions and hence their prior knowledge about how they perceive the environment. The researchers suggested that children’s environmental orientations could be placed on this continuum:

One further study (Loughland et al, 2003) that also takes up this idea focused on a research project in which 2,249 young people aged from 9 to 17 in New South Wales responded to the statement: “I think the term/word environment means ...”. Their responses were analysed and categorised into the six distinct conceptions listed in Table 14.

Table 14: Young people’s conceptions of environment (Loughland et al, 2003)

Object focus conception	Relational focus conception
1. The environment is a place.	1. The environment does something for people.
2. The environment is a place that contains living things.	2. People are part of the environment and are responsible for it.
3. The environment is a place that contains living things and people.	3. People and the environment are in a mutually sustaining relationship.

Yet again, these children’s conceptions of the environment suggest that environmental orientations could be placed on a continuum (shown below) where the children’s conceptions of the environment are localised at a point on the spectrum.



**Challenges and concerns linked to ESD assessment**

Several UNESCO documents (Biasutti & Surian, 2012; Michalos et al., 2012; Olsson, Gericke & Chang Rundgren, 2015) provide assessment scales that measure students’ competences, attitudes and behaviours regarding Sustainable Development (SD). The study by Olsson et al (2015) developed a Likert-scale questionnaire to evaluate the sustainability consciousness of young learners. This scale is based on UNESCOs (2005) pillars of SD: environment, economy and society. These pillars are seen to be linked and they are referred to in several research studies (Giddings, Hopwood & O’Brien 2002; Walshe, 2008).

Although it is essential to consider these pillars when talking about SD, they do not provide the complete picture. Education is an important dimension that is, regrettably, at times left out of some studies related to SD evaluation. Education needs to be considered as an essential component of SD because the educative process contributes considerably to supporting learners in developing humane values and attitudes that are consistent with SD. Education is in some way an assurance that citizens can be invited to embrace a sustainable lifestyle. Furthermore, to promote the effective participation of citizens in policy-making, participants’ learning experiences need to be nourished through constructivist and critical pedagogies, as these have the potential to produce an improvement in the quality of knowledge and attitudes that promotes sustainability (Biasutti, 2015; Scoullos, 2013).



Different theoretical backgrounds, such as the Model of Ecological Values, 2-MEV model (Schneller, Johnson & Bogner, 2015) and the New Environmental Paradigm (NEP) (Dunlap & van Liere, 1978; Fleury-Bahia et al., 2015), were used to develop the different assessment instruments in this area. To date there are no widely accepted and used assessment instruments available to examine the learning outcomes of ESD (Waltner et al., 2019). ESD assessments or evaluative tools have mainly come from researchers aiming to explore learners' knowledge, beliefs, values, attitudes and behaviour towards ESD, and from educators who wish to determine the effectiveness of teaching interventions. Past research studies indicate that most of these tools were developed in an educational setting, primarily for elementary or secondary schools (Dijkstra & Goedhart, 2012; Karpudewan, Roth & Chandrakesan, 2015; Olsson, Gericke & Chang Rundgren, 2015). There are however, few studies concerning the environmental attitudes and knowledge of college students (Biasutti, 2015; Shephard et al., 2011).

It is understandable that such tools have significant value and usefulness. They are good indicators of a learner's standing in a particular ESD scenario, yet they have been tailor-made for a particular scenario and context. It is understandable therefore, that when one is to apply them to other scenarios, it is the educator's expertise that needs to ascertain whether such a tool can be used in that context in a valid and reliable manner. Overall, it seems reasonable to state that a 'one size fits all' evaluative system exists only in theory. Such a tool, if proposed, would meet with significant resistance from the ESD community of educators, who might hold different views. The best one can do in this situation is to choose from the available set of well-designed flexible tools that are available.

### ***Continuums and assessment in ESD?***

As stated earlier, assessing whether or not outcomes have been achieved needs to be done through techniques that allow for the assessment of the learners' knowledge of content matter, the learners' development as regards critical thinking, behaviour, understanding of 'choice and consequence', and the learners' values involved and their internalisation. As opposed to the summative assessments that characterise assessment of learning in formal settings, assessment in ESD requires more qualitative and creative approaches used to evaluate changes in mindsets and in the behaviours of learners (Yiu, 2015). This assessment demands flexible strategies that are rooted in assessment for learning. This type of assessment allows educators to consider, in a holistic manner, the quality of the educational experience (Yueh, Cowie, Barker & Jones, 2010).

In deliberating on how the set of continuums described above can help in this assessment, one may ask: Can following a learner's progress along a continuum help an educator to assess learning in ESD? These continuums are a potentially useful starting point for educators who wish to guide their students to work towards and embrace a sustainable lifestyle. In identifying the position of a learner's conception of the environment on the focus conception continuum (outlined above), useful and valuable information about learners can be revealed. Furthermore, this information, coupled with a well-chosen assessment strategy, can provide pointers to where an educator should direct her/his future teaching activities so that the learning experience is guided by outcomes that are realistic, achievable and ESD oriented.

### ***Concluding reflections***

ESD is not just a knowledge base related to the environment, a country's economy and society at large. It addresses mindsets, learning skills and values that need to be internalised and that will eventually guide and motivate people to seek sustainable livelihoods. It is therefore essential to have assessment protocols that monitor the diverse teaching interventions that constantly surface in this field, so that feedback on the effectiveness of these interventions is reflected upon and made use of, to provide more focused learning experiences.

Assessment needs to gauge how well ESD activities prompt humankind to reflect once again on the common good and challenge the individualistic mentality that has permeated our world, so that people's involvement in local and global issues is encouraged. All educators are collectively responsible for ESD and, to encourage sustainable lifestyles, they must be prepared to internalise and believe in the values they are seeking to transmit.

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