Primary Years Programme

Learning and teaching

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IB mission statement

The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect.

To this end the organization works with schools, governments and international organizations to develop challenging programmes of international education and rigorous assessment.

These programmes encourage students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

IB learner profile

The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world.

As IB learners we strive to be:

INQUIRERS
We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.

KNOWLEDGEABLE
We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.

THINKERS
We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.

COMMUNICATORS
We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.

PRINCIPLED
We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.

OPEN-MINDED
We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.

CARING
We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.

RISK-TAKERS
We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.

BALANCED
We understand the importance of balancing different aspects of our lives—intellectual, physical, and emotional—to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.

REFLECTIVE
We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.

The IB learner profile represents 10 attributes valued by IB World Schools. We believe these attributes, and others like them, can help individuals and groups become responsible members of local, national and global communities.

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Contents

Overview

A model of transdisciplinary learning

Through acknowledging and aiming to foster the diverse capacities—physical, social, intellectual, aesthetic, cultural—of students, IB World Schools implementing the Primary Years Programme (PYP) ensure that learning is engaging, relevant, challenging and significant. A transdisciplinary approach encapsulates these aspects of learning; transdisciplinary learning in the PYP conveys learning that has relevance between, across and beyond subjects and transcends borders that confine them to connect to what is real in the world.

This resource aims to do the following.

- On a **theoretical** level, it reflects on transdisciplinarity in the PYP and reviews its transformative nature for early and primary years learners in the context of consolidated research and curriculum development worldwide.
- On an **operational** level, it demonstrates how the PYP framework and key elements of the PYP are designed to promote and strengthen transdisciplinary learning and teaching.
- On a **practical** level, it offers reflective questions for IB World Schools to push beyond traditional subject-based teaching to innovative concept-based and transdisciplinary approaches that bring relevance, authenticity and connection to student learning.

Transdisciplinarity

Definition of transdisciplinary and related terms

"Transdisciplinary" is often used interchangeably with "interdisciplinarity" and "multidisciplinarity". In fact, these models are not interchangeable; there are nuanced differences. As Nicolescu (1999: 3)—a physicist and leading transdisciplinary theorist—articulates, "transdisciplinarity is … distinct from multidisciplinarity and interdisciplinarity because of its goal, the understanding of the present world, which cannot be accomplished in the framework of discipline research".

What is the difference?

The following provides the most basic definitions of the terms.

Interdisciplinarity is concerned "with the links and the transfer of knowledge, methods, concepts and models from one discipline to another" (Padurean and Cheveresan 2010: 128). Disciplinary boundaries may blur. The transfer of knowledge can sometimes yield a new discipline. For example, when the disciplines of nuclear physics and medicine came together, they yielded a new treatment called chemotherapy (Choi and Pak 2006). Again, in everyday analogy, interdisciplinarity is represented as stew, where ingredients are partially distinguishable (Choi and Pak 2006).

Multidisciplinarity is concerned with studying a topic "in not just one discipline only, but several at the same time" (Nicolescu 2014: 187). Multidisciplinary learning begins and ends with the subject-based content and skills (Beane 1997). The boundaries among the subjects remain. Using an everyday analogy, multidisciplinarity is represented as a mixed salad where the ingredients remain separate and distinguishable (Choi and Pak 2006).

Transdisciplinarity "concerns that which is at once between the disciplines, across the different disciplines, and beyond all disciplines" (Nicolescu 2014: 187). Nicolescu notes that a key imperative of transdisciplinary learning is to unite knowledge for the understanding of the present world. In transdisciplinarity, the disciplines are no longer distinguishable, like the ingredients in a cake, and the result is something completely different (Choi and Pak 2006).

Transdisciplinarity transgresses subjects. It begins and ends with a problem, an issue or a theme. Students' interests and questions form the heart of transdisciplinary learning. It is a curriculum-organizing approach where human commonalities rise to the top without regard for subject boundaries. Subjects become an instrument/tool/resource to explore a theme, problem or concept in depth. The result is a different or new organizing framework (Beane 1997; Klein 2006).

Transdisciplinarity in the PYP framework

A transformative programme

The transformative nature of the PYP lies in its commitment to student learning in a transdisciplinary context, embedded in the curriculum framework and connected across key elements of the programme. It is a fundamental PYP belief that for early and primary years learners, continuous integration and connection of prior and new knowledge and experiences is the most meaningful way to broaden their understandings about, the world. When a curriculum approach goes across, between and beyond subjects, and emphasizes participatory and integrated learning, it honours the learners' curiosity, questions and voice, for whom the curriculum is intended (Beane 1995). Transdisciplinary learning in the PYP refers to learning that is not confined within the boundaries of traditional subjects but is supported and enriched by them.

The PYP transdisciplinary model differs from the interdisciplinary approach of the Middle Years Programme (MYP), the Diploma Programme (DP) and the Career-related Programme (CP). Despite their differences, all IB curriculum frameworks are broad, balanced, conceptual and connected. They "emphasize the importance of making connections, exploring the relationships between academic disciplines, and learning about the world in ways that reach beyond the scope of individual subjects" (IBO 2017: 5). To do so, the IB programmes use developmentally appropriate models of transdisciplinary, interdisciplinary and multidisciplinary learning. The differences between the IB programmes are summarized in figure 1.

Figure 1: Explanation of the IB programme differences

Programme	PYP	MYP	DP/CP
Model	**Transdisciplinary (transforming subject knowledge)**	**Interdisciplinary (integrating subject knowledge)**	**Disciplinary–Multidisciplinary**
Primary organizer	Key elements are: • knowledge • conceptual understandings • skills • dispositions • action. These are developed through six themes and supported by six subjects.	Eight subject groups are explored through the global contexts of: • identities and relationships • orientation in space and time • personal and cultural expression • scientific and technical innovation • globalization and sustainability • fairness and development.	Six DP subject groups are supported by the core, which include: • theory of knowledge (DP) CP students undertake a minimum of two DP courses, a career-related study and a core which includes: • personal and professional skills.

A new approach in education

By espousing the transdisciplinary approach in the late 1990s, the PYP charted a different course in school education. Early education literature with references to transdisciplinary learning relates mainly to tertiary education, specifically in the areas of science, technology and medicine. In 2006, UNESCO sponsored a presentation by Joy de Leo (2006: 10), entitled "Beyond the four pillars", which states that "UNESCO

encourages transdisciplinary approaches to education for sustainable development". The presentation listed emerging transdisciplinary approaches, many of which were already exemplified in the PYP, such as:

- the need for coherence in curriculum design
- schools as learning communities
- a collaborative, discovery approach to issues-based learning
- an active, participatory approach promoting critical thinking.

When first designing the PYP curriculum framework, the developers considered different approaches to organize the curriculum. In an effort to identify what 3–12-year-old students need to know and that could, at the same time, address globally significant issues, they called on the work of Boyer (1995) and Tye and Kniep (1991). The "human commonalities" put forward by Boyer in his seminal work, *The Basic School*, provided inspiration for defining the significant themes.

Figure 2: PYP transdisciplinary themes

Transdisciplinary themes
Who we are
Where we are in place and time
How we express ourselves
How the world works
How we organize ourselves
Sharing the planet

These themes are worth exploring regardless of where PYP students are in the world and with which ethnic or cultural group they identify. Framing the programme of inquiry, these globally and socially driven themes provide a starting point from which students can examine issues and opportunities as they are being experienced in the real world. Taken together, these themes provide students with authentic learning experiences that are not confined to the boundaries of traditional subjects because real-world problems have no boundaries.

The perspectives of Tye and Kniep on problems that crossed national boundaries and were interconnected culturally, ecologically, politically, economically and technologically, led to the focus on transdisciplinarity as a means to integrate the curriculum and as a philosophy to differentiate the PYP from other curriculums (IBO 2013a). Together, the transdisciplinary model and the transdisciplinary themes enable students and teachers to intentionally and contextually put knowledge to work in important ways for students, which Dewey and Dewey (1915) advocated:

- focus on personal and social significance
- unify learning in all its aspects.

Working together, the transdisciplinary themes and the transdisciplinary approach promote learning as outlined in figure 3.

Figure 3: Holistic learning in the PYP (Beane 1997; Boyer 1995; Vars 2000; Drake and Burns 2004)

Learning …	How
extends the international dimension of the PYP	The themes have global significance—for all students in all cultures and all places.
is authentic and engaging	The themes address contemporary challenges surrounding environment, development, peace and conflicts, rights and responsibilities, and governance.
is deep	The themes are revisited throughout the students' primary years so that the end result is immersion in broad-ranging, in-depth, articulated curriculum content.

Learning …	How
is cohesive	The themes contribute to the common ground that unifies the curriculum in all IB World Schools offering the PYP.
is connected	The model is supported by knowledge, conceptual understandings and skills from the traditional subject areas, but it uses them in ways that transcend the confines of these subjects.
is relevant and current	The model allows for resources to be drawn from current global events and technology development to prepare for the future.

IB mission alignment

Nicolescu (1996) argues that the global challenges of the era require that diverse systems of education focus on a common approach of questioning if we are to achieve a harmonious world. The themes identified in figure 3 are themes of global relevance—indicators of our shared humanity—and are key drivers of the PYP framework. Through these transdisciplinary and globally important themes, the IB mission permeates the PYP framework.

Transdisciplinarity provokes the learner into reflecting on, and reconsidering, what he or she believes about the world and about his or her place in it. In his seminal work, Freire (2005: 81) believed

> "students, as they are increasingly posed with problems relating to themselves in the world and with the world, will feel increasingly challenged and obliged to respond to that challenge".

And, in accord, the IB mission statement challenges all members of IB World Schools to "create a better and more peaceful world" (IBO 2017: 7).

Characteristics of the PYP framework

Developmentally appropriate learning

The transdisciplinary themes are cognitively and developmentally appropriate for young learners because they have enduring importance, and children can identify with them. Gardner and Boix Mansilla (1999: 83) maintain that these generative themes are "issues for which answers of various degrees of adequacy have been promulgated over the centuries in diverse cultures. These fundamental questions are articulated by young children, on the one hand, and by seasoned philosophers on the other …". The PYP themes are broad in scope and timeless by nature. Yet, when given the opportunity, children can demonstrate their capacity to use their incipient theories and explanatory framework to explore complex themes and to solve problems, as witnessed and documented at Reggio Emilia learning centres (Rinaldi 2006).

Indeed, young children naturally explore their questions through play and discovery (Bruner 1960). As they grow, children's play, or "early common sense", gradually evolves to "enlightened common sense" (Gardner and Boix Mansilla 1999: 85). This enlightened knowledge, however, is not a result of greater disciplinary knowledge, but of children's "potential for reflecting critically on an answer, for drawing on relevant daily experience, for engaging in discussion and dialogue and benefiting from such interchange" with people in their environment (Gardner and Boix Mansilla 1999: 85).

Beane (1995) further suggests that children do not come to school knowing the departmentalization of disciplines because their daily lives are not compartmentalized. Therefore, subject delineation is neither necessary nor natural. Even as subject-specific teachers at PYP schools extend their support for students transitioning to interdisciplinary and disciplinary thinking in the next stage of education in the MYP or other programmes, students will be best served by adopting the habits and methods of a disciplinary thinker within the broader transdisciplinary themes.

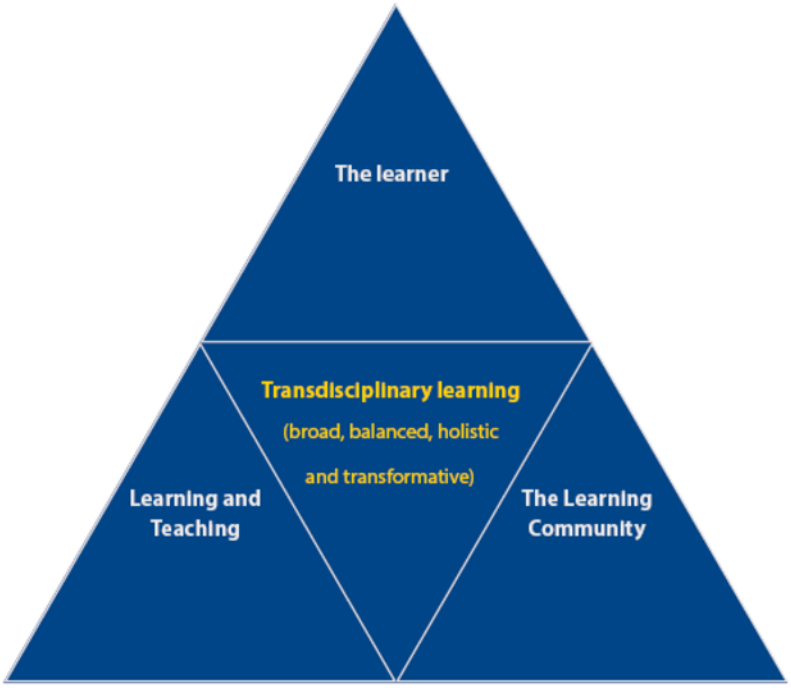
Connecting transdisciplinarity

The PYP framework supports the symbiotic relationship between the **learner, learning and teaching** and **the learning community**. Transdisciplinarity serves as an organizing principle for the written, taught, and assessed curriculum within learning and teaching. The intended output of the PYP framework and curriculum model is an educational experience that is coherent in all its aspects.

The transdisciplinary model aims to move students beyond looking for a "correct" solution towards a model that reflects the changing times (Mishra, Koehler and Henriksen 2011). It encourages the integration of many forms of knowledge and perspectives from all members of the learning community to make sense of a world that has become "too big to know" (Weinberger 2011).

The transdisciplinary model permeates all three pillars of the PYP curriculum framework—the learner, learning and teaching, and the learning community. Together, the PYP framework and elements within it contribute to a learning experience that is transdisciplinary (figure 4).

Figure 4: Transdisciplinary learning and the PYP framework



A transdisciplinary education, according to Nicolescu (2006: 14) "allows us to establish links between persons, facts, images, representations, fields of knowledge and action and to discover the Eros [love] of learning during our entire life".

Organized around transdisciplinary themes of personal and societal significance, explored collaboratively by the students and teachers, and supported by the learning community and rigorous approaches to learning and approaches to teaching, the PYP framework:

- inspires a coherent educational experience that is broad, balanced and holistic
- incorporates the needs and developmental stages of students
- considers the knowledge, conceptual understandings, skills and dispositions students need to engage in a changing world
- embraces the principles of an equitable education.

Connecting the learner

To understand the significance of the learner in transdisciplinary learning, it is necessary to review the definition of transdisciplinary in the literature. Piaget initially introduced the term "transdisciplinary" in 1970 as a "superior stage" of interdisciplinary where the prefix **trans-** referred to "across" and "between" disciplines (Nicolescu 2006). In 1985, Nicolescu (2006) introduced "beyond" to the definition. He argued that "across" and "'between" concerned mainly the **object**, namely knowledge. The inclusion of "beyond" emphasizes the role of the **subject** in knowledge creation, and clearly distinguishes transdisciplinary from multidisciplinary and interdisciplinary.

Transdisciplinarity reflects the interactions between the subject and object, and pushes thinking beyond the dichotomous—either/or filter—in classical problem-solving (Nicolescu 2010). He argues that the

traditional binary logic of A or B (that is, the room is empty or the room is not empty) leaves no room for a third possibility or reality. However, in the real world, there are many realities or possibilities.

In Nicolescu's (2014: 187) view, "the transcendence, inherent in transdisciplinarity, is the transcendence of the *Subject*," which is not captured in disciplinary or interdisciplinary learning. This view is supported by Montuori's assertion that knowledge is inherently relative and changeable precisely because the inquirers are the main actors of every inquiry (Montuori 2013). The learners or inquirers, individually and collectively, have "a history, a social and historical context, beliefs, values, biases, blind spots, ways of thinking, and so on" which frame their way of thinking (Montuori 2013: 205). Because of the inquirers' unique contexts and interpretations of data and events, it is unlikely that two inquiries of the same theme will arrive at the same outcome, leading to potentially new realities and the transcendence of learning.

By design, the language and intent of the transdisciplinary themes encourage students to share their voices and to explore their common ground collaboratively, from the multiple perspectives of their individual experiences and backgrounds. This sharing of experience increases students' awareness of, and sensitivity to, the experiences of others beyond the local or national community. Unplanned and planned access to learning and content are now given the same status, hence promoting learning that is more learner-centric and more accessible to them (Beane 1995).

In highlighting the importance of student voice, the PYP transdisciplinary model upholds the belief that students are better served when we support knowledge as a socially constructed process rather than an end goal, fixed and universal (Dewey 1991; Vars 1991; Beane 1997).

Connecting learning and teaching

The transdisciplinary approach is "the science and art of discovering bridges between different areas of knowledge and different beings. The principal task is elaboration of a new language, logic, and concepts to permit genuine dialogue" (Klein 2004: 516). By design, PYP inquiry and concept-based learning align neatly with, and contribute to, the transdisciplinary model. Supported by the subject scope and sequence guidance and the key programme elements, the transdisciplinary themes provide the means for students and members of the learning community to engage in genuine dialogues. Emerging through the inquiry process, these dialogues bridge subject knowledge and individual and collective experiences to articulate new visions and solutions for a more peaceful world.

Specifically, students and teachers engage with:

- the **programme of inquiry**—the structure that articulates loosely what, when and how to explore the transdisciplinary themes from 3–12 years
- **concepts** that have relevance across, between and beyond the subjects and that connect a wide-ranging knowledge to arrive at conceptual understandings
- the **approaches to learning** and **approaches to teaching** that are crucial for exploring subject knowledge in context with the transdisciplinary themes
- the opportunities to **reflect** and take **action** to enhance individual and collective understanding and learning or to address local and/or global challenges.

The PYP framework and the transdisciplinary approach encourage and support connections across learning and teaching as a means to raise student awareness of the relevance of their learning to their reality. PYP classrooms and schools are where the framework is turned into effective and innovative practice. Implementing the PYP in their own context, schools and their teaching teams bring to life the transdisciplinary learning experience for all in the community. They do so by developing curriculums, designing learning environments and experiences, and consolidating schedules to allow for collaboration. Every planning meeting is an opportunity for teachers to rework their personal interpretation of the relationship between theory and practice. They reflect on how their interpretation relates to the articulation of transdisciplinarity within an inquiry. Together, the PYP and IB World Schools provide students with the necessary knowledge, conceptual understandings, skills and dispositions so that they can "[sail] in and around islands of certainty" as well as "navigate on a sea of uncertainties" (Morin 1999: 3).

Connecting the learning community

While individual context, knowledge and experience contribute to and shape dialogues and inquiries, transcending knowledge requires that the "individual is mindful of the collective" (Augsburg, 2014: 237). Article 13 of the *Charter of Transdisciplinarity,* adopted at the First World Congress of Transdisciplinarity presupposes "Shared knowledge should lead to a shared understanding based on an absolute respect for the collective and individual otherness united by our common life on one and the same Earth regardless of background or beliefs" (CIRET 1994).

In other words, the value of transdisciplinary learning is the integration of knowledge and experiences from different participants, disciplines and perspectives, and not merely those of any single individual. Transdisciplinarity calls for a collaborative, community-based approach to resolving issues, and to considering opportunities centred on common themes. Transdisciplinary learning is about the human subject, namely students, teachers, members of the wider learning community and the "emotional relations between them and the object of knowing …" (Bostan 2015: 490). Designed to embrace both personal and social significance, "the transdisciplinary themes provide a basis for much discussion and interpretation within a school, and allow for both local and global perspectives to be explored" in every unit (IBO 2008b: 12).

On many levels, the IB World School community is a representation of new possibilities and realities to be explored. PYP students in over 100 countries bring to the IB community unique contexts. Their differences and commonalities not only have an impact on their individual exploration and interpretation of the transdisciplinary themes, but enrich and extend the collective dialogues across IB World Schools. By situating learning within local, national and global communities, we consider outcomes from both individual and collective perspectives, honour the rich cultural traditions of IB World School communities, and highlight the interdependence of everyone and everything to create a shared understanding of the world. Everyone in the IB community has agency to take action to effect change.

Many of the transdisciplinary themes, such as "Sharing the planet", "Where we are in place and time" and "How we express ourselves", signal a shared responsibility and invite communities to act based on collectively shared values and norms. Through the learning community, the PYP connects with the heritages of the host countries and with the principles of human development on which it is based. This sense and role of community in learning and teaching is a universal asset, particularly towards developing internationally minded individuals.

The geographical, cultural and linguistic representations and experiences of the IB learners (the subject) bring unique perspectives and dialogues to the complex issues of the time (the object), contributing to creative insights, knowledge, solutions or innovations (the "new realities").

Elements of the PYP framework

Exploring the elements

Effective teaching, Albright (2016: 532) believes, "is implicitly transdisciplinary", and, by design, multiple elements of the PYP bring to life transdisciplinary learning and teaching. These elements provide the foundation for students to develop transdisciplinary thinking, to explore real-life issues and to effect change. They support the development of "internationally minded people who recognize their common humanity and shared guardianship of the planet" (IBO 2017: 2).

Figure 5: The transdisciplinary elements of the PYP

Learning through the transdisciplinary themes

The transdisciplinary themes mark the starting point of student inquiries. It is within the context of each theme that students explore related central ideas and assimilate knowledge. These themes engage the learning community in rich dialogues and ongoing collaboration to build an understanding of themselves, their wider community and the world. Designed to have enduring value regardless of the geography or background of IB World Schools and students, the six themes provide guidance for what students will inquire into (figure 6). They:

- encapsulate our shared commonalities

- indicate the complexity and the connectedness of the human condition globally
- invite students to engage in dialogues about real issues in the world
- allow for authentic embeddedness of subject areas
- contribute to the uniqueness of the PYP.

Figure 6: Transdisciplinary themes and their descriptors

Transdisciplinary themes	Descriptions
Who we are	An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; rights and responsibilities; what it means to be human
Where we are in place and time	An inquiry into orientation in place and time; personal histories; homes and journeys; the discoveries, explorations and migrations of humankind; the relationships between, and the interconnectedness of, individuals and civilizations from local and global perspectives.
How we express ourselves	An inquiry into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values; the ways in which we reflect on, extend and enjoy our creativity; our appreciation of the aesthetic.
How the world works	An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.
How we organize ourselves	An inquiry into the interconnectedness of human-made systems and communities; the structure and function of organizations; societal decision-making; economic activities and their impact on humankind and the environment.
Sharing the planet	An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.

Transcending knowledge through a programme of inquiry

The transdisciplinary themes of global significance provide the context for schools to frame a whole-school programme of inquiry, which is a cornerstone of the PYP pedagogy and its flexible framework. The programme of inquiry articulates how the six transdisciplinary themes will be explored across the different age groups. It provides students in the early and primary years with the opportunity to experience a coherent and balanced curriculum. On one level, it is planned; on another level, it is dynamic because a transdisciplinary programme of inquiry leaves room for emergent and unexpected ideas, directions and connections that students might encounter. When this happens, the teaching team might modify the programme of inquiry or develop additional learning engagements outside the programme of inquiry.

The programme of inquiry fosters students' development of subject knowledge, skills, conceptual understandings and dispositions while simultaneously communicating to the learning community that transdisciplinary inquiries are creative rather than reproductive (Montuori 2013). Reproductive inquiries focus on topics; creative inquiries focus on themes or enduring understandings. Creative inquiry is a means to investigate the world and ourselves (Augsburg 2014). When the teaching team collaboratively plans each

unit in the programme of inquiry to identify significant, relevant, challenging and engaging central ideas for investigations, creative inquiries flourish and the transcendence of knowledge follows.

Designed collaboratively, each school's programme of inquiry reflects the unique aspects of that school community—from its geography, to the needs and experience of its members and associated local/national education requirements. Through the programme of inquiry, all learners—students, teachers, and members of the community—are researchers. They move from what they know through personal experience and prior knowledge into ways of seeing and knowing that may be new or unfamiliar to them. They locate and work with subject-specific knowledge and skills in relation to the themes. They compare and contrast the subjects' respective methods, tools and approaches to generate theories that support their conceptual understandings of the transdisciplinary themes. Through the programme of inquiry, they understand the essential interconnectedness and interdependence of themselves, other people and the planet.

Learn more about how to create a programme of inquiry.

Integrating subjects in the curriculum

While the PYP model espouses transdisciplinary learning, it is important to acknowledge that "the disciplines of knowledge are not the enemy. Instead, they are a useful and necessary ally" (Beane 1995: 616). So, the question is not whether there is a place for subject knowledge, but how to bring knowledge into the transdisciplinary unit in a compelling and authentic way.

Because transdisciplinarity cannot happen without disciplinarity (Nicolescu 2014), it is necessary that students gain basic understanding and skills in the disciplines to support knowledge integration. A functional command of the appropriate literacies (such as language, mathematics, science and the arts), and the motivation that comes from a level of mastery of those literacies, enable students to feel confident to contribute to collaborative problem-solving. Through subjects, students learn to appreciate the "ways of knowing"—the modes of thought and communication associated with a subject. They develop, for example, understandings of the methodologies associated with thinking like a scientist, a historian or an artist (Gardner and Boix Mansilla 1999).

Supporting the exploration of the transdisciplinary themes in context are six subject knowledge areas: language; mathematics; science; social studies; arts; physical, social and personal education. Each subject has its place in transdisciplinary learning because transdisciplinarity is as much about the liberal arts, cultural symbolisms and the social and natural sciences (Macdonald 2000). However, subject knowledge is not an end. Rather, it is a means to illuminate larger, more integrative ends (Boyer 1995).

The transdisciplinary theme and central idea of a unit under investigation contextualize subject knowledge in the inquiry process. While the scope and sequence guidance provides a roadmap for subject-specific knowledge, teachers sequence subject knowledge based on its relevance to the theme or central idea under investigation. Fostering transdisciplinary understanding requires that teachers consider subjects in relational terms to each other—and to the theme—as opposed to in isolationist or oppositional terms (Giri 2002). Specifically, transdisciplinary thinking requires that all specialists begin as a generalist so that the whole is more than the sum of its parts. The role of the teachers—classroom or specialist—is to support the creative reimagining of the subjects and to identify possibilities for combining them (Bernstein 2015) in context of the transdisciplinary themes.

Learn more about subject specific guidance in an inquiry.

See the PYP scope and sequence.

Crossing boundaries with concepts

A concept-driven curriculum, another cornerstone of an IB education, helps the learner to construct meaning through improved critical-thinking and the transfer of knowledge and understanding. In transdisciplinary learning, concepts play a particularly important role in "linking operators" of knowledge (Klein 2004). Whereas knowledge and boundaries between disciplines can change over time (Nicolescu 2014), concepts are organizing ideas that have relevance within and across subjects (Erickson 1998; Fogarty and Stoehr 2008) as well as across national and cultural boundaries. In effect,

concepts are transdisciplinary. Unlike subject-specific knowledge, concepts provide the language and the mental structure to foster ways of knowing and thinking across different subjects.

The PYP has identified seven key concepts and multiple related concepts that have significance for both transdisciplinary and subject-specific learning. These broad concepts provide a structure to explore authentic content. Each concept and combination of concepts link the subjects and increase coherence across the curriculum. In the course of this exploration, students deepen their disciplinary understandings, build capacity to engage with complex ideas, and activate transfer between disciplinary and transdisciplinary learning, and across educational and geographical contexts.

The sample units of inquiry (figure 7) illustrate how the intended flexibility of the transdisciplinary programme of inquiry allows for the creative integration of the PYP key concepts both inside and outside of the programme of inquiry.

Figure 7A: Integrating concepts in a unit of inquiry

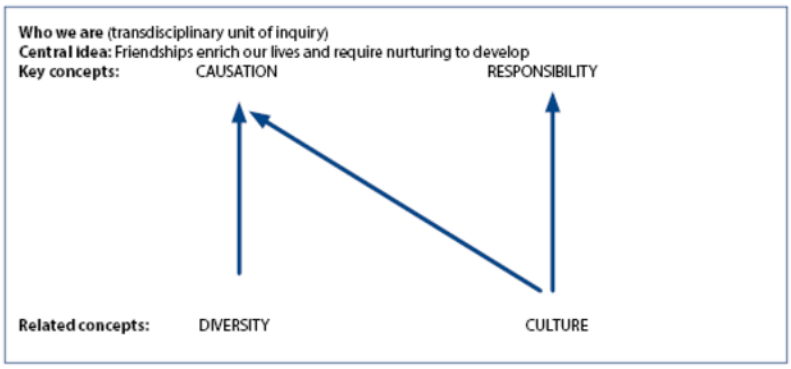


Figure 7B: Integrating concepts in a unit of inquiry

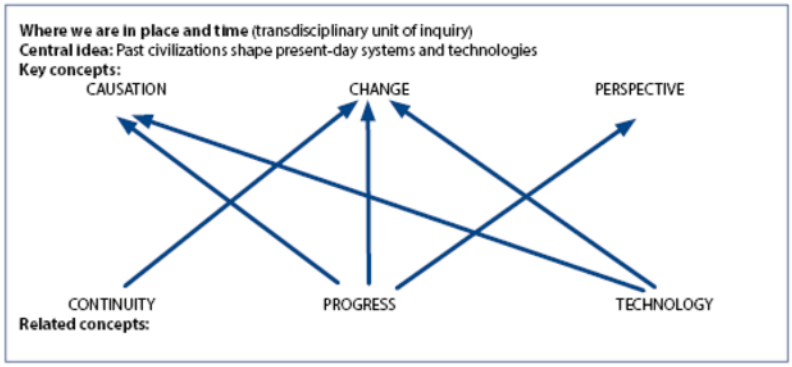


Figure 7C: Integrating concepts in a unit of inquiry

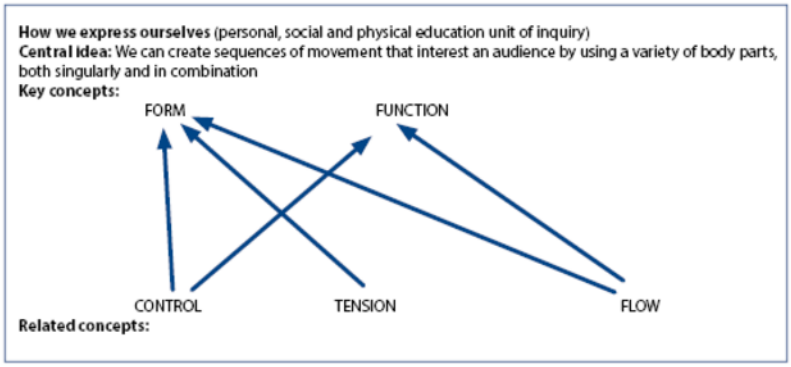
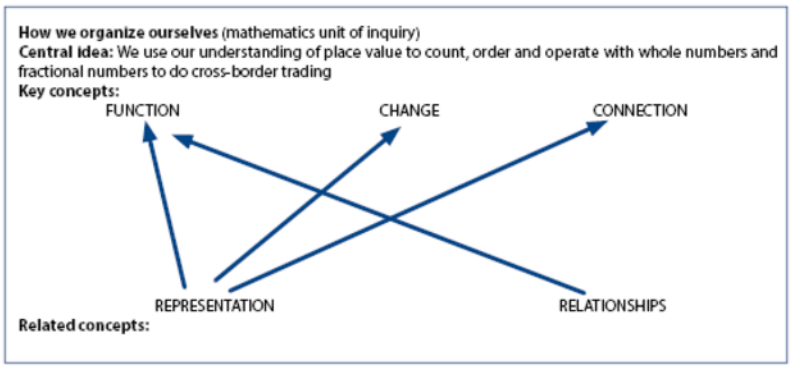


Figure 7D: Integrating concepts in a unit of inquiry



Learn more about how to support conceptual understandings

Developing the skills and dispositions of a transdisciplinary learner

Just as the IB has identified a set of attributes for the learner profile to nurture active, compassionate and lifelong learners, transdisciplinary researchers have also identified a set of ideal characteristics critical for cultivating a transdisciplinary attitude among individuals. These two sets of attributes share many commonalities, indicating a close alignment between a PYP learner and a transdisciplinary learner. As a start, the *Charter of transdisciplinarity* (CIRET 1994) lists **rigour**, **openness** and **tolerance** as the fundamental characteristics of the transdisciplinary attitude and vision. In parallel, the PYP encourages students to be open-minded and inclusive.

One attribute of the learner profile, **knowledgeable**, embodies the meaning of knowing through the transdisciplinary approach as described by Klein (1994): to know or to conceptualize knowledge involves moving from singularity to an integrative process. Specifically, learners move from simple to complex, from fragmented to connected and collaborative, from boundary-forming to boundary-blurring and from analysis to synthesis. This definition of knowledge is in keeping with the PYP commitment to transdisciplinarity.

Figure 9 outlines other examples of transdisciplinary characteristics articulated in research, together with their parallels in the IB learner profile and approaches to learning and approaches to teaching. These attributes are aimed at supporting learners to navigate across subjects, cross-group functions, processes and team dynamics.

Figure 8: Comparing characteristics of a transdisciplinary learner and a PYP learner

IB Learner profile attributes and skills	Transdisciplinary characteristics and attitudes (Augsburg 2014)
LP: Inquirer, principled, open-mindedness, risk-taking	Curiosity, respect, open-mindedness, risk-taking
ATL and ATT: Inclusivity, communication and listening skills, collaboration	Tolerance, communication and listening skills, teamwork

A separate strand of research suggests that teachers, too, can develop transdisciplinary habits of mind to support creative teaching (Henriksen 2016). Transdisciplinary thinking skills support effective approaches to thinking and working that cut across subject boundaries.

Learn more about how to support development of the learner profile

Learn more about how to support development of thinking skills in the approaches to learning section

Constructing shared understanding through language

How we know and how we communicate what we know rely on the power of language. Language learning and teaching is transdisciplinary by nature (Albright 2016). Students use language to draw upon their prior knowledge, experiences and cultural contexts to explore their inquiries. Language acts as a conduit for meaning-making and human connection. It enables the learner to access and to communicate knowledge, both general and subject-specific, to support meaning-making. Within this context, a multiliteracy approach to language learning provides a framework for deconstructing disciplinary meaning-making, resulting in new artifacts and understandings that relate to and represent the learners and their learning (Byrd Clark 2016).

The PYP's commitment to multilingualism is central both to fostering international-mindedness and to changing and shaping understanding based on the inquirer's perspectives and backgrounds. As discussed previously in the "Connecting the learner", **beyond** disciplines in transdisciplinarity reflects active interactions among the inquirers whose dialogues and negotiations are context-specific. Paraphrasing Despre et al., Klein (2004: 521) states that "rational knowledge … comes out of not only 'what we know' but 'how we communicate' it. This realization underscores the emergent quality of transdisciplinarity". Through language, learners express their unique perspectives and negotiate their ideas to shape new understandings. This inquiring process is what makes transdisciplinary learning a lived and context-specific experience. For this reason, language is equally important to sense-making as it is to the construction of shared and new knowledge and conceptual understandings.

By definition, multilingualism reflects the crossing of linguistic codes (Byrd Clark 2016). In the multilingual environment of many IB World Schools, multilingualism provides opportunities to explore cultural symbolism which, in turn, enriches transdisciplinary learning. In learning a new language, we take a step back from our ways of seeing the world, and explore other world views through the eyes of speakers of other languages. When members of a learning community reflect on their diversity through language, they move beyond the traditional national, cultural and social boundaries in their daily lives to develop international-mindedness.

Learn how to support language development.

Bridging differences with ongoing collaboration

Just as transdisciplinarity cannot happen without disciplinarity, the programme of inquiry cannot happen without a high level of collaboration among teachers, students and members of the learning community. Collaboration enables lateral, imaginative and creative thinking about solutions to problems, and about ooportunities that are not imaginable within the confines of one field. While early application of the transdisciplinary approach began largely in scientific research, it is generally believed that inputs from the arts and humanities have the potential to transform research and education related to sustainability into an entirely new experience (Clark and Button 2011). Therefore, PYP teachers—regardless of their subject expertise—are encouraged to engage in collaborative planning. Collaborative planning, teaching and reflection between classroom and specialist teachers ensure a robust programme of inquiry that provides students with current, coherent and connected learning experiences throughout their time in school.

Engaging with the concept of transdisciplinarity forces a paradigm shift that moves most teachers out of their comfort zone. Effective implementation of transdisciplinary learning through the PYP redefines traditional teacher–student relationships in the classroom. In this relationship, students become co-investigators in dialogue with the teacher, and they are jointly responsible for a process in which both students and teachers will grow (Beane 1997; Freire 2005). Similarly, the transdisciplinary approach asks that specialist teachers in the PYP step out of their areas of expertise to think as a generalist. This is necessary both to acknowledge that knowledge in all fields is subjective and fluid, and to support students to make authentic connections to their personal and collective interests. Tension is inherent in transdisciplinary learning and necessary for learning; it is through constantly questioning and challenging previously held assumptions that learning discoveries are shaped and connections are made.

School leaders play a key role in creating and supporting a culture of collaboration where members of the learning community find mutual trust, personal chemistry and a feeling of safety (Augsburg 2014) to enable them to take risks by stepping outside their boundaries. Through collaboration, teachers gain "the ability of look[ing] beyond [their] own disciplinary boundaries, the capacity for disciplined self-reflexivity, the ability to reflect on knowledge integration processes, and the ability to take on new ideas" (Augsburg 2014: 238)—all are necessary to bridge and to transcend knowledge.

Learn more about collaborative planning for learning and teaching.

Transcending learning through student action

In the last two decades, the concept of transdisciplinarity has also been adopted as an approach to address complex projects relating to real-world topics around built and natural environments. One such example is the concept of sustainability as an approach to address societal problems and to find solutions to environmental, social, economic and cultural challenges (Lawrence and Després 2004). This new direction implies that beyond bridging the gap between disciplines, the transdisciplinary approach can also bridge the gap between knowledge derived from disciplinary research and societal decision-making processes. This move highlights transdisciplinarity simultaneously as "an attitude" to approach complex issues and as "a form of action" to address them (Klein 2004). The shift is not entirely surprising in that "transdisciplinarity presupposes an individual ethics, a desire to improve society and to contribute to the advancement of the common good" (Augsburg 2014: 233).

Indeed, the IB was founded on a desire to provide an education that enables students to understand and manage the complexities of the world in order to create a better and more peaceful world. International-mindedness goes beyond developing awareness and understanding to fostering engagement and action. With their focus on human commonalities, the PYP's transdisciplinary themes offer students opportunities to transcend learning through authentic and meaningful action. These themes provide real-life contexts to evoke student-initiated action in response to their inquiries. In a PYP school where students have agency, action is a tangible demonstration of personal and collective understandings of the transdisciplinary themes to make a difference for positive change.

Learn how to support students to take action.

Celebrating and demonstrating transdisciplinary learning through the exhibition

In the final year of the PYP, students engage in an exhibition—a student-led inquiry into a subject of interest to them. This is both a demonstration of student agency and a reflection on students' capacity to orchestrate their own learning. The exhibition offers students the opportunity to put their interests, transdisciplinary thinking, knowledge, conceptual understandings, skills and attributes of the learner profile into action. They undertake their investigation both individually and with their peers, together with the guidance of a mentor, who can be from within or outside the school community.

A case study (Medwell, Cooker, Bailey and Winchip 2017) involving 334 students in five countries provides clear evidence that the PYP exhibition leaves tangible impacts on students. It highlights the development of international-mindedness and critical-thinking skills being the positive results of the exhibition, as reported by the students. The study also finds students to have strong interests in engaging with societal issues including the environment (23%), human rights (26%), science (20%) and humanities (18%). Parents felt similarly positive about the exhibition, stating that the skills their children developed through the exhibition provided them with "real-world" competencies to further their education and life beyond school.

The exhibition and its benefits are important reminders of the powerful educational effect when student agency, and the agency of the community, are combined with a transdisciplinary curriculum. The result is the development of internationally minded students who can make a positive difference in their own lives and the lives of others.

Learn how to support the student exhibition.

Evidence of transdisciplinary learning

Consideration of practices

The goal of transdisciplinarity in the PYP is to unite knowledge and skills for the understanding of the transdisciplinary themes. Subject knowledge is a means to explore and to construct understanding of the transdisciplinary themes, rather than an end in itself.

Transdisciplinary learning requires not only a high degree of collaboration among all members of the learning community, but also a shift in mindset. It necessitates that specialists think as generalists, even as they facilitate understanding of a subject in which they have expertise to support student inquiries. As article 3 of the *Charter of transdisciplinarity* (CIRET 1994) states:

> "Transdisciplinarity does not strive for mastery of several disciplines but aims to open all disciplines to that which they share and to that which lies beyond them."

As such, the role of the teachers—both specialists and generalists—is to provide students with the necessary understandings, tools and ways of knowing from subjects to explore the opportunities and challenges of each transdisciplinary theme. Beyond supporting the inquiry process, thinking as a generalist or classroom teacher can strengthen teacher–student interactions, leading to student engagement and well-being not achievable through the specialization model of teaching (Fryer 2016).

The starting point of a PYP inquiry is the central idea. During planning and reflection, teachers may consider the following guiding questions to enhance transdisciplinary learning and thinking.

- Are students and teachers exploring their unit of inquiry through the lens of **student-initiated questions** that lead to understanding of the transdisciplinary themes, rather than through the lens of the subjects?
- Is the **starting point of an inquiry to explore the central idea**, drawing on subject-specific knowledge to support the inquiry? Or is it to first teach subject-specific skills and knowledge and see how the subjects support the understanding of the central idea?
- Do learning activities and experiences reflect **real-world contexts**, using appropriate subjects as tools to evaluate the central idea, as well as associated opportunities and challenges?
- Do the lines of inquiry enhance the **possibilities for personal and collective integration of subject knowledge** in order to arrive at shared conceptual understandings of the central idea?
- Is subject-specific teaching aimed at uniting knowledge by identifying **opportunities to connect to the theme under investigation** or is it aimed at mastery of the subject?
- Do all teachers, including specialists, collaborate to find **shared conceptual understandings** of the central idea without specifically calling out the specificity of a subject?

Figure 9 provides further reflective statements for schools to self-assess their transdisciplinary practices. These statements support schools to move from practices that resemble multidisciplinary and interdisciplinary learning and teaching to transdisciplinary learning and teaching.

Figure 9A: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Planning	The central idea provides the starting point for specialists and the grade-level teacher to plan their respective inquiries and activities separately	The central idea provides a starting point and continues to be the context and the motivation from which the teaching team plans, shares and reflects with students collaboratively.

Practice	Moving from	Moving to
	Teachers plan the units of inquiry to strictly follow the subjects' scope and sequence guidance as they are laid out.	Teachers plan the units of inquiry based on the interests and emerging theories of students, and incorporate the scope and sequence in context.
	The teaching team formally pre-plans all inquiring activities and knowledge-integration opportunities at the start of a unit and implements the unit according to the plan.	The teaching team loosely pre-plans learning experiences and then modifies these as necessary to respond to student-directed questions and investigations during implementation.
	The planner is a record of transdisciplinary teaching.	The planner is a living illustration of ongoing collaboration to facilitate transdisciplinary thinking and learning.
	The teaching team plans the entire unit of inquiry without consultation with students.	Teachers co-construct a unit of inquiry with students.
	Learning goals are planned using the backward design approach (Wiggins and McTighe 2005) at the start of the unit and are assessed at the end of the unit.	Learning goals are articulated using the backward design approach at the start of the unit, and are adjusted based on ongoing monitoring and documenting of student questions, theories, knowledge and skills development.

Figure 9B: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Specialist teaching	Subject knowledge is taught separately from the unit of inquiry.	Subject knowledge is integrated as the instrument of the learning process from which students draw to explore the central idea and related lines of inquiry.
	Subject knowledge and skills are taught when it is convenient for the teachers.	Subject knowledge and skills are taught when it is pertinent for the exploration of the central idea and associated lines of inquiry.
	Specialist teachers approach the central idea firstly as a specialist and secondly as a generalist.	Regardless of their expertise, all teachers approach the central idea firstly as a generalist and secondly as a specialist.

Figure 9C: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Scheduling	The schedule revolves around the subjects.	The schedule revolves around the lines of inquiry and related learning experiences.
	The schedule places artificial starting and ending points for an inquiry.	The schedule flexibly accommodates the inquiry based on the context and relevance of subject integration, interests and events at the time.

Figure 9D: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Inquiring	Investigations of a unit and learning experiences draw on subjects, concepts and skills one at time or sequentially.	Investigations of a unit and learning experiences draw on a combination of concepts, subject knowledge and ATL skills as needed in reference to the lines of inquiry.
	Lines of inquiry or activities focus on topics, for example, dinosaurs, volcanoes, festivals, and so on.	Lines of inquiry or activities focus on enduring concepts that span subjects, for example, perspective, connection, change, adaptation, transformation, interdependence, and so on.
	Students are encouraged to find the one "correct" reality/answer/solution.	Teachers acknowledge that there could be multiple realities/answers/solutions and encourage students to identify, inquire into and share them.
	The use of one language is preferred in researching an inquiry and articulating learning.	The use of multiple languages is encouraged, depending on the comfort and preference of the learner.

Figure 9E: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Reflecting	The teaching team comes together to reflect at the end of each unit.	The collaborative teaching team, or a subset of the teaching team, meets, exchanges formal and informal observations in person or through planning documentations throughout the inquiry process.

Figure 9F: Reflection statements to self-assess transdisciplinary practices

Practice	Moving from	Moving to
Student grouping	Students begin and end the inquiry in the same group.	Students have opportunities to work with peers based on interests, skills, knowledge, personal preference and other criteria.

Summary

A commitment to transdisciplinary learning

The PYP's commitment to a transdisciplinary programme of inquiry in the 1990s was ahead of its time. Today, the PYP transdisciplinary programme remains developmentally appropriate for young learners and a powerful way to support active learning, creativity, critical abilities and imagination—all of which influential sociologist Bourdieu (1990) believed should be the driving principles of a curriculum. Through its commitment to transdisciplinary learning, students learn to appreciate knowledge, conceptual understandings, skills and personal attributes as a connected whole. They can reflect on the significance of their learning to take meaningful action in their community and beyond. Through this process of learning in the PYP, students become competent learners who have the cognitive, affective and social tools to engage in lifelong learning in a self-directed manner.

In evaluating the prospect of tertiary education reform, Ertas (2000: 14) asserts, "the most important aspect of education is not the imparting of specific knowledge, but rather the learning of how to find knowledge when it is needed, how to assimilate that knowledge, how to integrate that knowledge, and how to synthesize new ideas and solve problems". The PYP transdisciplinary programme is doing exactly that. What's more, by emphasizing transdisciplinary themes, inquiry and conceptual understandings, the PYP promotes learner agency and values learner contribution and diversity as integral to the learning process. It further honours the finely honed intuition and experience of classroom teachers as they are given the autonomy to develop a programme of inquiry that is fit for purpose. In a healthy, conducive learning environment where everyone has voice, choice and ownership in the learning process, students and teachers flourish because they are complementary and supplementary to the success of the other. Finally, it recognizes the need for flexibility among schools to adopt and adapt the transdisciplinary programme of inquiry to meet local and national standards, to provide opportunities for students to address local opportunities and challenges, and to simultaneously help students develop the necessary competencies to navigate this changing world.

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What is the evidence of the effectiveness of integrated curriculum approaches?

Transdisciplinary learning has no precedent in primary schooling. However, variants of integrated learning have been subjects of empirical research since the early 1900s, when Dewey advocated inquiry-based learning based on lived experiences and social justice. The frequently cited evidence supporting the effectiveness of integrated curriculums include the "Eight Year Study" (Aikin 1942, Lipka et al 1998) and two follow-up studies.

Collectively, research reviews (Vars 2000; Caskey and Anfara 2006; Drake et al. 2015) found multiple positive student effects for a variety of approaches that have elements of curriculum integration such as problem-based, inquiry, interdisciplinary or experiential learning, and so on. These reviews cover primary to high school. Figure 10 includes the results of these reviews, as well as research-evaluated PYP student outcomes (Sillisano et al. 2010; Tan and Bibby 2011; Pushpanadham 2013).

Figure 10

Benefits of curriculum integration in comparison with traditional curriculums

Student engagement	Academic learning	Affective responses/ dispositions
Intellectually curious	Similar, and often better, results than conventional programmes	Better critical-thinking skills
More motivated to learn	Higher grade-point average	Better problem-solving skills
Higher, or more consistent, attendance	More academic honours	Objective and systematic thinking
A feeling of connection to school and educators	Higher graduation rate	Stronger sense of self-efficacy and self-confidence
Higher degree of social and teacher–student interaction	Greater college attainment	More self- and culturally aware

An integral part of an IB education

Summary

- Approaches to learning (ATL) are grounded in the belief that learning how to learn is fundamental to a student's education.
- Five categories of interrelated skills and associated sub-skills support students of all ages to become self-regulated learners.
- Through a variety of strategies, teachers collaboratively plan for implicit and explicit opportunities to develop ATL both inside and outside the programme of inquiry.

Approaches to learning (ATL) are an integral part of an IB education and complement the learner profile, knowledge, conceptual understanding and inquiry. Formerly known as "transdisciplinary skills" in the Primary Years Programme (PYP), these skills will now be referred to as "approaches to learning".

These skills are grounded in the belief that learning how to learn is fundamental to a student's education. Five categories of interrelated skills aim to support students of all ages to become self-regulated learners who know how to ask good questions, set effective goals and pursue their aspirations with the determination to achieve them. These skills also help to support students' sense of agency, encouraging them to see their learning as an active and dynamic process (IBO 2017).

Although the ATL are relevant from 3 to 19 years of age, it is particularly important for PYP teachers to interpret these skills in ways that are appropriate for early and primary years learners. All teachers foster and support the development of these skills by providing opportunities embedded in authentic learning experiences.

Subject-specific skills and approaches to learning

When learning about and through the subjects, students acquire skills that best help them to learn those subjects. For example, in language, the students become literate, and in mathematics they become numerate. The acquisition of literacy and numeracy skills, in their broadest sense, is essential, as these skills provide students with the tools to inquire.

Beyond the skills of literacy and numeracy, there is a range of interrelated approaches to learning that are transferable across contexts. These skills support purposeful inquiry and set the foundations for lifelong learning. The development of these skills is frequently identified in education literature as crucial in supporting students to effectively learn and succeed inside and outside of school, (Trilling and Fadel 2009; Wagner 2014). The five interrelated approaches to learning are:

Figure ATL01: The five interrelated approaches to learning

The IB's ATL aim to support student agency and the development of cognitive and metacognitive skills and dispositions so that students view learning as something that they "do for themselves in a proactive way, rather than as a covert event that happens to them in reaction to teaching" (Zimmerman 2000: 65). Together, these ATL help students think, research, communicate, socialize and manage themselves effectively.

Embedded within the ATL are digital literacy skills that can be an invaluable resource for information gathering or processing, as well as for critical and creative thinking, communication and collaboration.

By combining ATL and the attributes of the learner profile, PYP students become self-regulated learners. Self-regulated learners are agents of their own learning. They know how to:

- set learning goals
- ask open-ended questions
- generate motivation and perseverance
- reflect on achievement
- try out different learning processes
- self-assess as they learn
- adjust their learning processes where necessary

(Zimmerman and Schunk 2001; de Bruin et al. 2012; Wolters 2011).

The ATL and sub-skills

Although the ATL are presented as distinct categories with associated sub-skills, there are close links and areas of overlap between them. For learning that is connected, it is important that students and teachers recognize these skills as interrelated. For example, the skill to synthesize information or data, and the ability to draw conclusions from the data, are related to thinking and research skills.

Figure ATL02 provides some examples of sub-skills—which schools may choose to focus on, modify or add to—based on their contexts. Working collaboratively during the planning process, teachers are encouraged to determine necessary skills, based on context and need, and document and monitor them as learning goals.

Figure ATL02: The five interrelated skills and sample sub-skills

Categories	Sub-skills
Thinking skills	• Critical-thinking skills (analysing and evaluating issues and ideas) • Creative-thinking skills (generating novel ideas and considering new perspectives) • Transfer skills (using skills and knowledge in multiple contexts) • Reflection/metacognitive skills ((re)considering the process of learning)
Research skills	• Information-literacy skills (formulating and planning, data gathering and recording, synthesizing and interpreting, evaluating and communicating) • Media-literacy skills (interacting with media to use and create ideas and information) • Ethical use of media/information (understanding and applying social and ethical technology)
Communication skills	• Exchanging-information skills (listening, interpreting, speaking) • Literacy skills (reading, writing and using language to gather and communicate information) • ICT skills (using technology to gather, investigate and communicate information)
Social skills	• Developing positive interpersonal relationships and collaboration skills (using self-control, managing setbacks, supporting peers) • Developing social-emotional intelligence
Self-management skills	• Organization skills (managing time and tasks effectively) • States of mind (mindfulness, perseverance, emotional management, self-motivation, resilience)

Connecting approaches to learning and approaches to teaching

The learning community has an important role in supporting the understanding and development of ATL. In a social-constructivist environment, students co-construct knowledge with peers and teachers, and develop their skills more effectively with guidance and support from teachers and mentors (Toshalis, Nakkula 2012).

Many of the ATL may be apparent in context of a certain natural ability or talent. The IB believes that proficiency in any of these skills can be supported through the deliberate use of techniques and strategies, feedback and challenge (Toshalis, Nakkula 2012).

For example, current research on "creativity" challenges conceptions of creativity as limited to individual psychological traits; it is also learnable and can be achieved in dynamic groups (McWilliam 2009). Functional intelligence, creativity and other skills are malleable and can be developed when students are given opportunities to practise them (Bransford et al. 2005; Mangels et al. 2006).

The changeable nature of intelligence, ability and motivation highlights the need for teachers to personalize learning based on individual needs and students' development (Toshalis, Nakkula 2012). Through collaboration with students and ongoing assessment, teachers effectively group and regroup students to support the development of the ATL. A classroom that honours student voice, choice and ownership also encourages them to identify peers with whom to practise their skills.

Teachers create opportunities for skill development inside and outside the programme of inquiry, and map them vertically and horizontally across the curriculum. Teachers understand that proficiency in using and applying a skill comes with practice. To achieve this, teachers model the skill and provide scaffolds when introducing a skill for the first time. They consider the multiple contexts across the units of inquiry in which students can practice and transfer skills. In goal-setting, students and teachers collaborate to identify skills for development or for further practice.

It is important to recognize that all members of the learning community continue to develop the ATL and associated sub-skills throughout their lives. With exposure and experience, learners improve and become better at learning to learn; therefore, skills can be at different levels of proficiency. For example, a research skill looks very different in the early and primary years, in high school, in university and in the workplace. Knowing where students' skill levels are relative to the context, the learning goal or developmental stage can help teachers personalize the opportunity for skills practice and application.

Reflecting on students' existing competencies, and through ongoing documenting and monitoring of students' emergent skills, teachers provide opportunities for students to be exposed to new skills, to further develop existing skills and to apply and transfer skills in various contexts (Berliner 2004).

Developing ATL holistically

Through collaborative planning, teachers also consider the learner profile attributes and identify a connection to the ATL. For example, thinking skills are necessary to become an effective thinker or an inquirer.

Consider a unit of inquiry with the central idea "Government systems address the needs of a variety of communities". The teachers decide to challenge students to choose a community issue that is relevant to them and find out how the government made (or is making) decisions to solve the issue. Students decide to consider a novel solution to the issue that could be administered within the current government system. The inquiry requires the development of critical- and creative-thinking processes. Through the inquiry, students demonstrate the learner profile attributes of "reflective thinker" and "open-minded" in response to the central idea and the ATL that will be developed in the unit of inquiry.

Supporting the development of the approaches to learning holistically also requires that teachers seamlessly integrate them implicitly as part of the classroom culture and explicitly as part of inquiry.

Embedding the ATL implicitly in the classroom culture

Teachers may consider:

- using the language of the ATL
- modelling the ATL
- giving feedback about ATL
- highlighting the use of ATL in children's literature and in the learning spaces
- setting up essential agreements and routines around the ATL.

Establishing the ATL explicitly through an inquiry

Together with students, teachers may consider:

- co-constructing ATL goals
- identifying specific ATL for development in a unit of inquiry
- reflecting on specific ATL from the unit
- personalizing ATL for further support
- designing specific learning engagements to support the development of an ATL
- monitoring the development of ATL.

Fostering the development of ATL

All ATL can be facilitated explicitly or implicitly through a variety of strategies. In supporting students' skills development, teachers are mindful of the difference between opportunities that arise authentically and those that are explicitly planned. While there are times when explicit skills teaching is necessary, teachers aim to support the development of these skills in authentic, integrated and meaningful contexts.

When appropriate, teachers use exemplars to demonstrate what skills look like in different learning contexts; use the language of skills in feedback; share their own experiences using and practising a particular skill; and encourage transfer of skills across contexts and the curriculum.

TSM: Explicitly teaching thinking skills

These tables are for use with primary years students. For early years guidance on ATL, please refer to the early years.

Figure ATL03 provides some examples of sub-skills—which schools may choose to focus on, modify or add to—based on their contexts.

Figure ATL03: How teachers support ATL

Categories	What teachers do:
Thinking skills	• Model the language of thinking and reinforce the processes of thinking. • Ask open-ended questions. • Provide sufficient thinking time. • Implement and model a range of "visible thinking" techniques. • Explicitly ask students to discuss and reflect on the value and limitations of the resources used through their inquiries. • Provide time for reflection at all stages of learning—before, during and after inquiries. • Promote a range of tools for reflection and ensure that reflection activities are responsive and varied. • Reflect on existing competencies, co-create learning goals.
Research skills	• Plan transdisciplinary and subject-specific inquiries in which students can develop, apply and reflect on their research skills. • Provide a range of tools for students to organize their research so that all stages are documented. • Model academic integrity by providing proper citations and references for materials and ideas that are shared with students. • Collaborate with, for example, the librarian and technology specialists support students to build research skills and to learn how to identify reliable sources of information.

Categories	What teachers do:
Communication skills	• Plan opportunities for students to practise and apply these skills in meaningful contexts. • Provide time for students to plan and prepare communication activities. • Encourage students to consider potential challenges and opportunities arising from shared ideas. • Encourage physical cues. • Encourage communication using different languages. • Ask open-ended questions. • Put thinking ahead of knowing. • Have informal conversations. • Encourage students to explore a variety of perspectives and modalities.
Social skills	• Provide explicit opportunities for students to practise and develop social skills. • Provide opportunities for students to reflect on their social skills. • Reflect and feedback on different interactions they observe. • Offer students opportunities to see that "other people, with their differences, can also be right". • Use the language of the learner profile in conversations and discussions, and in the development of essential agreements. • Model the social skills.
Self-management skills	• Provide opportunities for students to monitor and manage their learning to make progress. • Involve students in planning. • Build resilience by ensuring that learning goals co-constructed with students are challenging but achievable. • Create an atmosphere where students regard learning as a process of gradual improvement. • Continually reflect on how they are supporting student agency as an intrinsic motivation to success. • Support students to manage distractions.

Students have a key role in the development of the approaches to learning, figures ATL04–08 provide some examples of sub-skills—which students may choose to focus on, modify or add to—based on their learning.

Figure ATL04: Thinking skills – what students do

Thinking skills	
Sub-skills	**What students do:**
Critical thinking Analysing and evaluating issues and ideas, and forming decisions	**Analysing** • Observe carefully in order to recognize problems. • Consider meaning of materials. • Take knowledge or ideas apart by separating them into component parts. • Use models and simulations to explore complex systems and issues. **Evaluating** • Organize relevant information to formulate an argument. • Evaluate evidence and arguments, and associated decisions.

Thinking skills	
Sub-skills	**What students do:**
	• Recognize unstated assumptions and biases. • Consider ideas from multiple perspectives. • Synthesize new understandings by finding unique characteristics; seeing relationships and connections. • Test generalizations and conclusions. • Identify obstacles and challenges. **Forming decisions** • Develop contrary or opposing arguments. • Propose and evaluate a variety of solutions. • Revise understandings based on new information and evidence. • Draw conclusions and generalizations.
Creative thinking Generating novel ideas and considering new perspectives	**Generating novel ideas** • Use discussions and diagrams to generate new ideas and inquiries. • Practise "visible thinking" strategies and techniques. • Make unexpected or unusual connections between objects and/or ideas. • Design improvements to existing products, processes, media and technologies. **Considering new perspectives** • Ask "what if" questions and generate testable hypotheses. • Apply existing knowledge to design new products processes, media and technologies. • Consider multiple alternatives, including those that might be unlikely or impossible. • Practise flexible thinking—develop multiple opposing, contradictory and complementary arguments. • Practise "visible thinking" strategies and techniques. • Generate metaphors and analogies.
Information transfer Using skills and knowledge in multiple contexts	• Use memory techniques to develop long-term memory. • Inquire in different contexts to gain different perspectives. • Make connections between units of inquiry and between subjects. • Transfer conceptual understandings across transdisciplinary themes and subjects. • Combine knowledge, conceptual understandings and skills to create products or solutions. • Apply skills and knowledge in unfamiliar situations or outside of school. • Help others develop conceptual understandings and skills.
Reflection and metacognition Using thinking skills to reflect on the process of learning	• Identify strengths and areas for improvement. • Consider new skills, techniques and strategies for effective learning. • Record thinking and reflection processes. • Reflect on their learning by asking questions such as: What did I learn today? What don't I yet understand? What questions do I have now?

Thinking skills	
Sub-skills	**What students do:**
	What can I already do? What will I work on next? What can I do to become a more effective learner? What factors are important for helping me learn well? Have I been a principled and balanced thinker? (for example, considering ethical, cultural and environmental implications).

Figure ATL05: Research skills – what students do

Research skills	
Sub-skills	**What students do:**
Information literacy Formulating and planning, data gathering and recording, synthesizing and interpreting, evaluating and communicating	**Formulating and planning** • Ask or design relevant questions of interest that can be researched. • Outline a plan for finding necessary information. • Evaluate and select appropriate information sources and/or digital tools based on the task. **Data gathering and recording** • Gather information from a variety of primary and secondary sources. • Use all senses to find and notice relevant details. • Record observations by drawing, note taking, charting, tallying, writing statements, annotating images. **Synthesizing and interpreting** • Sort and categorize information: arrange information into understandable forms such as narratives, explanatory and procedural writing, tables, timelines, graphs and diagrams. • Use critical literacy skills to analyse and interpret information. **Evaluating and communicating** • Draw conclusions from relationships and patterns that emerge from data. • Present information in a variety of formats and platforms. • Understand the significance of academic integrity and intellectual property rights. • Create references and citations, use footnotes/endnotes and construct a bibliography according to recognized conventions.
Media literacy Interacting with media to use and create ideas and information	• Locate, organize, analyse, evaluate and synthesize information from a variety of trusted sources, social media and online networks. • Compare, contrast and draw connections among (multi)media resources. • Seek a range of perspectives from multiple and varied media sources. • Demonstrate awareness of media interpretations of events and ideas. • Communicate information and ideas effectively to multiple audiences using a variety of media and modalities.
Ethical use of media/ information Understanding and	• Use media ethically to communicate, share and connect with others. • Differentiate reliable from unreliable resources. • Understand the impact of media representations and modes of presentation.

Research skills	
Sub-skills	**What students do:**
applying social and ethical technology	

Figure ATL06: Communication skills – what students do

Communication skills	
Sub-skills	**What students do:**
Exchanging information Listening, interpreting and speaking	**Listening** • Listen to, and follow the information and directions of others. • Listen actively to other perspectives and ideas. • Ask for clarifications. • Listen actively and respectfully while others speak. **Interpreting** • Interpret visual, audio and oral communication: recognizing and creating signs, interpreting and using symbols and sounds. • Understand the ways in which images and language interact to convey ideas. • Recognize the meaning of kinaesthetic communication (body language). • Be aware of cultural differences when providing and interpreting communication. **Speaking** • Speak and express ideas clearly and logically in small and large groups. • Give and receive meaningful feedback and feedforward. • State opinions clearly, logically and respectfully. • Discuss and negotiate ideas and knowledge with peers and teachers. • Communicate with peers, experts and members of the learning community using a variety of digital environments and media.
Literacy Reading, writing and using language to gather and communicate information	**Reading** • Read a variety of sources for information and for pleasure. • Read critically and for comprehension. • Make inferences and draw conclusions. • Use and interpret a range of terms and symbols. **Writing** • Use appropriate forms of writing for different purposes and audiences. • Paraphrase accurately and concisely. • Record information and observations by hand and through digital technologies. • Use a variety of scaffolding for writing tasks. • Organize information logically. • Make summary notes. • Communicate using a range of technologies and media. • Understand and use mathematical notation and other symbols. • Responsibly participate in, and contribute to, digital social media networks.
ICT	• Understand the impact of media representations and modes of presentation.

Communication skills	
Sub-skills	**What students do:**
Communicating using technology to gather, investigate and share information	• Make informed choices about modes of communication based on audience. • Communicate information and ideas effectively to multiple audiences using a variety of media and modalities.

Figure ATL07: Social skills –what students do

Social skills	
Sub-skills	**What students do:**
Interpersonal relationships, social and emotional intelligence Developing positive interpersonal relationships and collaboration	**Interpersonal relationships** • Practise empathy and care for others. • Listen closely to others' perspectives and to instructions. • Be respectful to others. • Learn cooperatively in a group: being courteous, sharing, taking turns. • Help others to succeed. • Build consensus and negotiate effectively. • Make fair and equitable decisions. • Encourage others to contribute. • Take on a variety of roles in group learning. • Advocate for one's own rights and needs, and those of others. **Social and emotional intelligence** • Be aware of own and others' emotions. • Manage anger and resolve conflict. • Be self and socially aware. • Be aware of own and others' impact as a member of a learning group.

Figure ATL08: Self-management skills –what students do

Self-management skills	
Sub-skills	**What students do:**
Organization Managing time and tasks effectively	• Plan short- and long-term tasks. • Set goals that are challenging and realistic. • Use time effectively and appropriately. • Bring necessary equipment and supplies to class. • Keep an organized and logical system to document learning. • Understand and use learning preferences. • Use technology effectively and productively. • Take on and complete tasks as agreed. • Delegate and share responsibility for decision-making.
States of mind	**Mindfulness** • Use strategies to support concentration and overcome distractions. • Be aware of body–mind connections.

Self-management skills	
Sub-skills	**What students do:**
Using strategies that manage state of mind	**Perseverance** • Demonstrate persistence. • Use strategies to remove barriers. **Emotional management** • Take responsibility for one's own actions. • Use strategies to prevent and eliminate bullying. • Use strategies to reduce stress and anxiety. • Manage anger and resolve conflict. **Self-motivation** • Practice positive thinking and language that reinforces self-motivation. **Resilience** • Manage setbacks. • Work through adversity. • Work through disappointment. • Work through change.

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Inquiry in the PYP

Summary

- Play, problem-based learning, collaboration, experimentation, and explicit teaching all have a place within well-considered inquiry-based learning experiences.
- Inquiry is purposeful and authentic.
- The inquiry process builds capacity through student agency where voice, choice and ownership feature strongly.

The spirit of inquiry

Inquiry, as the leading pedagogical approach of the Primary Years Programme (PYP) recognizes students as being actively involved in their own learning and as taking responsibility for that learning. PYP learning is approached with a spirit of inquiry. Drawing from the transdisciplinary themes and students' interests, inquiry is an authentic way for students to relate to, explore and understand the world around them.

A large body of research, supported by experiences of teachers worldwide, has informed the IB in committing to purposeful concept-based inquiry that engages students actively in their own learning (Kuhlthau, Maniotes, Caspari 2015), (Bonnstetter 1998). The IB believes that this is the way in which students learn best.

As part of the learner profile, students are supported in becoming "inquirers". Inquiry nurtures curiosity and promotes enthusiasm for life-long learning. Effective inquiry encourages students to think, challenge and extend their ideas; it prompts students to reflect and take action. Through the inquiry process, students develop and demonstrate/practice the approaches to learning and attributes of the learning profile.

Inquiry is purposeful and authentic. It incorporates problem solving and supports students in achieving personal and shared goals. Inquiry extends students' learning when the exploration of initial curiosity generates new questions and wonderings. By situating inquiry in meaningful contexts, connections are made between personal experiences to local and global opportunities and challenges.

Learning and teaching in the IB grows from an understanding of education that celebrates the many ways people work together to construct meaning and make sense of the world. The inquiry process supports the development of international mindedness. Represented as the interplay between asking (inquiry), thinking (reflection) and doing (action), this constructivist inquiry process leads towards open classrooms where different views and perspectives are valued. This process is the basis of the design and implementation of learning and teaching in all IB programmes.

The inquiry process

Connecting passion with intention, the inquiry process builds capacity through student agency where voice, choice and ownership feature strongly. PYP teachers and students collaborate to plan for inquiry through a wide range of strategies, tools and practices that suit learning goals, reflect the learner profile, respond to students' interests and understandings, and the school's culture and context.

Through the inquiry process, students move from current understandings to new and deeper understandings. This process involves:

- exploring, wondering and questioning
- experimenting and playing with possibilities
- making connections between previous learning and current learning

- making predictions and acting purposefully to see what happens
- collecting data and reporting findings
- clarifying existing ideas and reappraising perceptions of events
- applying concepts to deepen conceptual understandings
- researching and seeking information
- establishing and testing theories
- solving problems in a variety of ways
- taking and defending a position.

Designing an inquiry

Inquiry can range from teacher guided to completely open inquiries (Bonnstetter 1998). The PYP emphasizes guided inquiry as a leading pedagogical approach. Guided inquiry scaffolds students' cognitive processing, supporting them to gradually learn and construct more complex understandings (Hmelo-Silver, Duncan, Chinn 2007).

Play, problem-based learning, collaboration, experimentation, and explicit teaching all have a place within well-considered inquiry-based learning experiences. In these experiences, teachers respond to students' emergent questions, theories and discoveries. In addition, they create opportunities for open, student-initiated inquiries. These inquiry approaches are fit for purpose to facilitate the development of the learner profile and support students to become critical and creative thinkers, researchers, collaborators and communicators.

Considerations for inquiry learning

What does inquiry learning look like?

Move from	Move towards
Time	
A timetabled methodology for specific lessons/activities at specific times.	A rigorous process of continuous learning through inquiry.
Fixed time frames and prescribed inquiry stages.	Open-ended time frames and flexible processes for inquiry.
Facilitation	
Adherence to one style of inquiry as a recipe for learning.	Conscious decisions regarding guided and open student-initiated inquiry as it fits the purpose of learning.
Linear process of inquiry, reflection then action.	Inquiry as an ongoing, iterative process of asking, thinking and doing.
Skills taught in isolation of the programme of inquiry.	Development of skills are considered in authentic contexts within the units of inquiry.
Teaching as moving students through lists of activities with pre-determined timelines and learning goals.	Inquiry as multi-layered process of investigation and research balancing planned learning experiences with emergent avenues for exploration.
Use of concepts and questions to find pre-determined answers.	Use of concepts and questions as a means to construct new understandings.
Assessment as a final phase of learning.	Assessment as an ongoing, varied and integral process to inform teaching and next steps in the inquiry.

Move from	Move towards
Student action planned by the teachers at the start of an inquiry	Responsible student-initiated action, emerging throughout inquiry
Collaboration	
An individualized, isolated learning experience.	A collaborative, co-constructed experience.
Students as recipients of teaching.	Students as active partners in constructing meaning.
Fixed ability groups for subjects and programme of inquiry	Planning for grouping and regrouping throughout learning experiences.
Teachers work individually to support the unit of inquiry	Teachers continuously collaborate to support the unit of inquiry.

Time for inquiry

Concept-based inquiry through transdisciplinary themes requires some timetable considerations. The process of inquiry needs sustained time. Short class times or continual interruptions to learning result in disruption to student questioning, collaboration, reflection and action. Lack of sustained time for learning undermines the self-efficacy of students and can have an impact on the depth of understanding.

Collaborative practice

The key to developing collaborative practices and a successful inquiry programme is regular and systematic planning among year level teachers, specialists and other support staff using the PYP planning process. Multiple PYP planners for planning "units of inquiry" are provided to PYP schools to support each learning community in designing and facilitating student inquiries.

Explicit teaching

There is a role for direct subject specific knowledge and skill teaching to support the cognitive processing for learning (Sweller 2004) and to add richness to the inquiry process. There are times when this explicit teaching may be a moment with a whole class before, during or after an inquiry. At other times, it may be with a small group or an individual. In an inquiry classroom, explicit teaching occurs "just in time" (Hmelo-Silver, Duncan, Chinn 2007) not "just in case". Students build their conceptual understandings by making connections between the new knowledge acquired from explicit teaching and their prior knowledge.

Resources

In addition to time, student/teacher collaboration and foundational knowledge and skills, resources in schools such as technology, the library, books, design materials, manipulatives, arts and science supplies and more contribute equally to the depth of an inquiry. Carefully considered resources and learning spaces extend students' thinking, research and communication skills during the inquiry process. In addition, students and teachers may consider resources in the learning community to further and extend their inquiry.

Action and inquiry

Successful inquiries generally lead to responsible student actions; actions can lead to further inquiry. Actions initiated by the students as a result of the learning process are most powerful. These may include actions that extend the students' learning or have a wider social impact. Inquiry and action will look different within each age range and from one age range to the next. The transdisciplinary themes provide the global contexts for inquiry and can encourage students to take responsible action in a variety of situations encountered through the curriculum.

Inquiry in practice

The role of teachers

PYP teachers understand that learning is activated when students can connect knowledge to concepts and personal experiences in meaningful ways. To support agency, teachers use multiple strategies, tools and resources to spark interest and create tension through provocation, collaboration, investigation and reflection.

TSM: Inquiry in a primary setting

Inquiry manifests itself in different ways, depending on the nature of students' curiosity and on their desire to know more about the world. Connecting students' interests with intention, teachers nurture authentic learning experiences by creating opportunities for student voice, choice and ownership in the inquiry process.

Figure IN01 unpacks the different aspects of the teacher's role in inquiry.

Figure IN01: Teachers role in inquiry

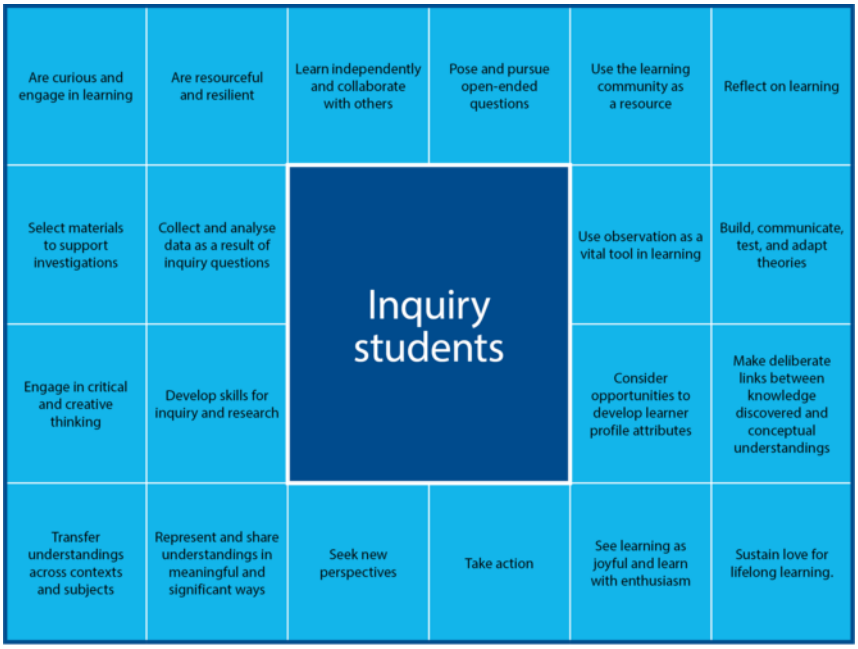
Teachers continually group and regroup students during the inquiry process to:

- support the development of meaning making and skills in different contexts
- support relationship building
- build on students' shared interests

Students as inquirers

Recognition of the value of positive relationships forms the foundation for successful inquiry and builds self-efficacy and agency. Through the inquiry process, students develop and sustain positive relationships with peers, teachers and others in the learning community in a spirit of active engagement. They also strive to make meaningful connections with environments, ideas, materials and concepts. Students acquire knowledge, build conceptual understandings and develop skills through inquiry by:

Figure IN02: Students as inquirers



TSM: Developing a culture of questions

The learning community and inquiry

As inquiries in the PYP are based on human commonalities that have relevance to everyone in the learning community and beyond, members of the wider community also play a meaningful role in the inquiry process. There are multiple ways they can support student inquiries:

- serve as experts in a unit of inquiry
- serve as mentors in inquiries, such as the exhibition
- provide opportunities for students to take action through their organizations.

Family members can further support student inquiry by:

- talking about the inquiry being explored in class
- talking about the value of the inquiry process as well as learning goals
- encouraging interest and curiosity with learning activities at home
- encouraging and modelling communication skills
- browsing online content to support children in developing research skills
- encouraging children to share their inquiries with extended families or friends
- conducting open inquiries or building projects together.

Further reading

Background: Theory of inquiry learning

Reflective inquiry

The inquiry models described in education literature has its origins in Dewey's five stages of reflective thinking, placing critical thinking, reflection and action as inseparable in an inquiry environment (Dewey 1933).

Inquiry stands at the heart of social constructivism. "Inquiry, as Dewey conceived it, is transformational and transactional. Both student and teacher are called to be artists in the construction of a better life and a better world" (Wickersham 2002).

Implementation of Inquiry

Inquiry can range from a structured form where students are provided with data or information to analyse, through guided inquiry where teachers present the initial questions but leave the methods, solutions and development of further questions for students, to open inquiry where students pose questions and find solutions (Bonnstetter 1998; Jordan 2005). Direct teaching occurs in inquiry classrooms. Teachers direct learning by "careful prompts at strategic times" (Audet 2005). This teaching may be with the whole class, small groups or individuals, but it occurs where needed to support a learning community working together to build shared understandings (Lave, Wenger 1991).

Inquiries take different paths depending on the starting points, interests and experiences of students and teachers. This means that teaching through inquiry is inherently open and can take many directions based on student and teacher reflections.

Inquiry is often falsely equated with "hands-on" or "experiential learning". Although these facets may be observed in an inquiry classroom, it is the attempt to draw meaning out of the experience through continual reflection which distinguishes inquiry from any other paradigm (Audet 2005). Reflection leads to the development of dispositions that supports students in managing their own learning. As they are guided through inquiry, students learn how to reflect, find and solve problems themselves.

Inquiry supports true differentiation. When students are encouraged to follow a reflective pathway, the need for streaming or acceleration of students mostly disappears. They develop the ability to inquire into the known and unknown, to think critically and creatively about their own actions and those of others, to request proof, to critique opinions and to look for diverse points of view (Zuckerman 2003). Inquiry with reflection and action weaves international-mindedness into the daily fabric of IB classrooms. The relationships involved in this process call on all attributes of the learner profile. The "what to learn" merges with how it is learned (Harrison, Behrenbruch 2013).

Inquiry learning and other constructivist models

Inquiry learning is often equated with discovery learning, project based or problem based learning (PBLs) or experiential learning. As similar as these may sound to inquiry learning, it is important to make distinctions. In some of these methods, the emphasis is on the end product rather than the inquiry process. In many cases, discovery learning and PBLs focus on solving problems generated only by the teacher rather than those generated by students, in contrast to inquiry which considers the agency of the student. In other cases, discovery and PBLs provide less guided or scaffolded experience for students to develop knowledge, conceptual understandings and skills. In addition, problems are not the only basis for inquiry. It can be provoked by curiosity, joy and wonderment (Behrenbruch 2012). Experiential learning is often observed in

PYP classrooms, but it is the attempt to draw meaning out of the experience through reflection which distinguishes PYP inquiry from any other paradigm (Audit 2008).

All these models have a place at different points in the inquiry process. For example, the "puzzlements" that may arise through discovery learning could serve as a differentiation point where interests and questions of the students drive the inquiry. The engagements and experiences in a relevant and challenging inquiry could result in the development of an individual or group project focused on action.

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Concepts and conceptual understanding

Summary

- Concept-based inquiry is a powerful vehicle for learning that promotes meaning and understanding, and challenges students to engage with significant ideas.
- Concepts are powerful, broad and abstract organizing ideas that may be transdisciplinary or subject-based.
- Concepts help to build understandings across, between and beyond subjects.
- Key concepts provide a lens for conceptual understandings within a transdisciplinary unit of inquiry; related concepts provide a lens for conceptual understandings within a specific subject.

A concept-driven curriculum

Concept-based inquiry is a powerful vehicle for learning that promotes meaning and understanding, and challenges students to engage with significant ideas. This is central to the Primary Years Programme (PYP) philosophy. Purposeful inquiry is supported by a concept-driven curriculum (Wiggins, McTighe 2005).

A concept-driven curriculum is the means through which students develop their conceptual understandings. Students co-construct beliefs and mental models about how the world works based on their experiences and prior learning. They integrate new knowledge with their existing knowledge and apply these understandings in a variety of new contexts. They learn to recognize patterns and see the connections between discrete examples to strengthen conceptual understandings.

Concepts

A concept is a "big idea"—a principle or notion that is enduring and is not constrained by a particular origin, subject matter or place in time (Erickson 2008). Concepts represent ideas that are broad, abstract, timeless and universal. Concepts add depth and rigour in student thinking to the traditional "two-dimensional" curriculum consisting of facts and skills. Concepts place no limits on breadth of knowledge or on depth of understanding, and therefore are accessible to every student.

Concepts help to:

- explore the essence of a subject
- add coherence to the curriculum
- deepen disciplinary understanding
- build the capacity to engage with complex ideas
- build understandings across, between and beyond subjects
- integrate and transfer learning to new contexts.

Concepts are powerful, broad and abstract organizing ideas that may be transdisciplinary or subject-based. They represent the vehicle for students' inquiry into the opportunities and challenges of local and global significance. Concepts are concise; they are usually represented by one or two words.

Key concepts

The PYP identifies seven key concepts (figure CO01) that facilitate planning for a conceptual approach to transdisciplinary and subject-specific learning. Together, these key concepts form the component that drives the teacher- and/or student-constructed inquiries that lie at the heart of the PYP curriculum.

Figure CO01: Seven key concepts

Key concepts	Key questions	Definition
Form	What is it like?	The understanding that everything has a form with recognizable features that can be observed, identified, described and categorized.
Function	How does it work?	The understanding that everything has a purpose, a role or a way of behaving that can be investigated.
Causation	Why is it as it is?	The understanding that things do not just happen; there are causal relationships at work, and that actions have consequences.
Change	How is it transforming?	The understanding that change is the process of movement from one state to another. It is universal and inevitable.
Connection	How is it linked to other things?	The understanding that we live in a world of interacting systems in which the actions of any individual element affect others.
Perspective	What are the points of view?	The uderstanding that knowledge is moderated by different points of view which lead to different interpretations, understandings and findings; perspectives may be individual, group, cultural or subject-specific.
Responsibility	What are our obligations	The understanding that people make choices based on their understandings, beliefs and values, and the actions they take as a result do make a difference.

Key concepts drive learning experiences and help to frame a unit of inquiry. By identifying and investigating key concepts, students learn to think critically about big ideas. This may be done through broad, open-ended questions in an inquiry. When concepts are viewed as a set of questions, the inquiry is directed, purposeful and manageable.

The questions associated with the key concepts in figure CO01 are a starting point. They represent an introduction to a way of thinking about learning and teaching. They can be used in any order and as regularly as the students and teachers require. There can be more than one concept in an inquiry. In collaboration with students, teachers identify and document the most relevant key concepts in each unit. While the seven concepts in figure CO01 have been identified in the curriculum framework, they are not the only concepts worth exploring, and schools are encouraged to add to this list.

As an example, consider a unit under the transdisciplinary theme "How the world works" with the central idea "Over time, living things adapt to their unique environments" (unit example 1).

- The key concept of "form" could focus the unit on classification and geographical descriptions.
- The key concept of "connection" could focus the unit on how the characteristics of the species connects to features of the environment to ensure survival.
- The key concept of "perspective" could focus the unit on the theories of evolution and adaptation.

Students may choose particular geographies, species or human-initiated change that are significant, relevant, challenging and engaging within this inquiry. As big ideas, concepts place no limits on breadth of knowledge or on depth of understanding, and therefore provide opportunities for every student to participate, regardless of particular background or interests.

Related concepts

Related concepts explore key concepts in greater detail and also add depth to the programme. In contrast to the broad key concepts, related concepts are more narrowly focused. All subjects have associated concepts that reflect the nature of its specific content. For example, in science, "adaptation" could be a

related concept connected to the key concept of "change"; in individuals and societies, "sustainability" could be a related concept associated with "change and responsibility".

Figure CO02 provides some examples of related concepts. Additional related concepts can be found in the PYP scope and sequence documents. However, there are an unlimited number of related concepts that may be drawn from state/provincial/national curriculums to support the inclusion of those requirements into the units of inquiry.

Figure CO02: Examples of related concepts

Key concepts	Key questions	Examples of related concepts
Form	What is it like?	Properties Structure Similarities Differences Pattern
Function	How does it work?	Behaviour Communication Pattern Role Systems
Causation	Why is it as it is?	Consequences Sequences Pattern Impact
Change	How is it transforming?	Adaptation Growth Cycles Sequences Transformation
Connection	How is it linked to other things?	Systems Relationships Networks Homeostasis Interdependence
Perspective	What are the points of view?	Subjectivity Truth Beliefs Opinion Prejudice
Responsibility	What are our obligations?	Rights Citizenship Values Justice Initiative

From concepts to conceptual understandings

Inquiries in the PYP begins with the central idea. The central idea is the primary conceptual lens that frames the transdisciplinary unit of inquiry. It provides teachers with a structure to introduce concepts that span across national, cultural and subject boundaries to support students' conceptual understandings of a transdisciplinary theme. Supporting agency means recognizing that students bring to the inquiry varying degrees of prior knowledge, and differing cultural and personal perspectives and experiences to the inquiry. These differences may result in a range of conceptual understandings arising from the concepts and ultimately the central idea. Whereas knowledge is locked in time and place, the rich and fluid context of the learners and the learning community renders conceptual understandings that are changeable and may be elaborated or reinterpreted (Milligan and Wood, 2010). For this reason, Milligan and Wood (2010: 492) suggest that "conceptual understandings are better understood as transition points rather than endpoints". The central idea, therefore, is a platform from which students launch their intellectual exploration of the transdisciplinary themes.

Key concepts provide a lens for conceptual understandings associated with a transdisciplinary theme; related concepts provide a lens for conceptual understandings within a specific subject. Concepts facilitate depth and complexity in learning and provide a structure for conceptual understandings that build upon the knowledge and skills to extend and deepen student learning. Compared to simply learning or memorizing isolated facts, locked in place and time, conceptual understandings are changeable, contextual, and may be elaborated or reinterpreted (Milligan, Wood 2010).

The exploration and re-exploration of concepts lead students towards an appreciation of ideas that transcend disciplinary boundaries, as well as towards a sense of the essence of each subject. Students gradually work towards a deepening of their conceptual understandings as they approach those concepts from a range of perspectives.

Knowledge = FACTS = know

Concepts = BIG IDEAS = understand

Differentiating concept- and fact-based learning

Concept-based learning moves beyond facts and leads to breadth and depth of understanding. Exploring concepts distinctly differs from exploring facts in the following ways.

Figure CO03: Facts versus concepts

Facts	Concepts
• Knowledge-based • Content-driven • Skills-related • Supported by evidence • Frequently topical • Encourage recall and comprehension	• Open-ended • Enable exploration of big ideas • Highlight opportunities to compare and contrast • Explore contradictions • Lead to deeper disciplinary and transdisciplinary understandings • Promote transfer to familiar or less familiar situations, issues, ideas and contexts • Encourage analysis and application
For example, a central idea that is more limited to the exploration of facts versus transferable concepts limits the opportunities of making connections beyond the inquiry.	
A central idea such as "Penguins have adapted to a unique Antarctic environment" has fewer transferable opportunities beyond the inquiry.	The central idea "Over time, living things adapt to their unique environments" is transferable to many different contexts.

Supporting conceptual understandings

Conceptual understandings within the programme of inquiry

In the PYP, conceptual understandings are the aim of a unit of inquiry and forms the central idea. Students arrive at, and deepen their conceptual understandings by inquiring into concepts through a range of perspectives under the central idea. Written in a neutral voice, the central idea is defined as a statement that concisely expresses understandings and connections of the chosen concepts. The statement should be substantial and open-ended enough to support students' understanding of the transdisciplinary theme and the concepts to which the theme is connected.

By exploring concepts through a central idea, conceptual understandings are promoted and extended. Students explore concepts in each unit by calling on prior experiences to direct their learning and make connections with other concepts. As their conceptual understandings deepen, students effectively transfer and apply their understandings to construct meaning when they re-encounter similar concepts or encounter new concepts. To ensure students have opportunities to develop conceptual understandings for all key concepts, teachers integrate the concepts across age groups and themes in the programme of inquiry.

Exploring concepts is particularly important in culturally diverse school contexts where students bring rich "cultural and linguistic capital" (Darling-Hammond et al. 2015) to promote cross-cultural understanding, to create an inclusive learning environment and to enrich learning and teaching. Carefully developed central ideas promote conceptual understanding by inviting students to:

- think critically about big ideas
- recognize patterns
- make generalizations, predictions and connections across their learning
- transfer understanding to different contexts.

This can be demonstrated in the following example.

Figure CO04: Unit example 2

Transdisciplinary theme	Central idea	Key concepts	Related concepts
Who we are	People's relationships have an impact on health and well-being.	Function Connection Responsibility	Cooperation Friendship Balance

Teachers can make broad conceptual statements more specific, age-appropriate and focused by asking "Why/how does this relationship or principle occur?" and "What are the implications of these conceptual understandings?"

Development of central ideas that are broad and extend students' conceptual understandings across, between and beyond subjects requires time, careful thought and collaboration among members of the teaching team.

Conceptual understandings in single subjects

Students and teachers also use the key concepts, associated questions and related concepts to guide inquiries in subject-specific learning and teaching. The subject scope and sequence documents provide many examples of central ideas aimed to develop conceptual understandings. The following are some examples derived from those documents.

Figure CO05: Examples of conceptual understanding

Central ideas for subject-specific inquiries.	Key concepts	Related concepts	Subjects
Patterns can be generalized using algebraic expressions, equations or functions.	Form Function Connection	Pattern Equation Algebra	This may be a stand-alone mathematics unit to introduce algebra.
We write in different ways for different purposes.	Form Causation	Genre Purpose	This language unit may be developed through a writing portfolio that can be used across several transdisciplinary units of inquiry.
Over time, living things adapt to their unique environments.	Change Connection Responsibility	Adaptation Extinction Habitats	This stand-alone science unit could connect to a unit of inquiry on human migration.

All learning and teaching, including subject knowledge acquisition, is through concept-based inquiry. As PYP teachers become familiar with concepts and conceptual understandings, they identify authentic links between subjects and within the programme of inquiry. Single-subject teachers and support teachers connect learning through the programme of inquiry's central ideas wherever the learning is authentic. At other times, they plan their own conceptual inquiries to explore concepts that connect to the grade-level central ideas.

For example, an inquiry may be developed around the key concept of change. An art teacher explores how art aesthetics have "changed" over time and a PE teacher inquires into the skills needed to "change" from an offence to a defence position in a team sport. Students transfer their understanding of how to inquire into "change" from one context to a new one. By exploring a similar concept in different contexts, students come to appreciate and to develop new understandings and ideas that transcend subject boundaries. Teachers collaboratively plan, reflect and make adjustments as a teaching team throughout the year to ensure a coherent learning experience.

Promoting and modelling conceptual understandings

Teachers promote and model the development of conceptual understandings. Carefully crafted questions, wonderings and provocations:

stimulate critical-thinking skills by:

- providing opportunities to build on prior knowledge and experience
- expanding beyond factual knowledge
- stressing the importance of the "how" and "why" of learning
- sparking student curiosity and engaging them to think conceptually
- inviting investigation
- inviting students to justify their answers
- wording questions in ways that are accessible to students
- asking open-ended questions to allow for personal interpretation
- encouraging pattern-finding in student thinking

expand thinking by:

- generating further questions and inquiries
- seeking clarification and deepening understanding

- opening up possibilities for collaborative dialogues
- emphasizing breadth and depth of understanding
- facilitating the co-construction of meaning and engaging students in their reasoning

connect learning and support the transfer of knowledge by:

- encouraging the application of prior knowledge and skills
- creating opportunities to reflect on concepts across, between and beyond subjects
- ensuring relevance to students' experiences inside and outside school
- opening up possibilities for further inquiry
- offering opportunities to revisit concepts over time
- encouraging application and transfer of learning in different contexts
- linking prior understanding to current inquiry and current understanding to future inquiry.

Additional considerations

- How might evidence of conceptual understandings be documented?
- How does the design of learning spaces continually promote and provoke student questions and wonderings?
- What resources might engage students in thinking about the central idea? (For example, artifacts, experts, field trips, literature, multimedia.)
- How might multimodal communication strategies be available to express conceptual understandings?
- What connections can be made to the local environment to ensure authentic learning engagements?
- Do learning engagements lead to deepening conceptual understanding as the unit progresses?

Learning and teaching strategies

Strategies that support the development of conceptual understandings or central ideas will vary depending on the needs of individual students. The examples of strategies below can apply at any point of an inquiry, providing opportunities for students to build on their knowledge and experiences.

Sketch the concept: On a blank piece of paper, students create a sketch that visually represents their understanding of the central idea. They use symbols and/or pictures only—no words.

Concept map: Students use a concept map to show connections and relationships that develop through the inquiries. These concept maps provide an ongoing representation of the central idea as students add ideas and adjust their thinking.

Exit cards: Students develop questions that they still have about the central idea.

Observation: Teachers observe students as they explore an idea or task, and engage the students in conversation about their current understandings of the central idea. Observations may be recorded as anecdotal notes, audio recordings or by using a checklist or rubric.

Self-assessment: Students make entries in their journals or discuss what they have learned about the central idea/ conceptual understanding being explored. They analyse their thinking and plan for how they might further investigate the central idea.

Bus stop: The concepts being explored in the unit are presented on separate sheets. In groups, students creatively think about, and record, their ideas about the connection to the central idea using symbols and words. Each group moves around each sheet and reads what others are thinking, adding new ideas to the original ideas presented.

Provocations: Throughout an inquiry, teachers and students initiate, stimulate, challenge and extend learning through activities or artifacts that invite (and provoke) new thinking about the central idea. Provocations can include posing questions and wonderings for discussion, making a change to the physical or social learning space, stories, film, bringing in a visitor or artifacts, or inviting a response to a recent event or natural phenomenon.

This list is not exhaustive and schools are encouraged to explore other ideas.

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Developing a transdisciplinary programme

Summary

- A transdisciplinary programme of inquiry offers students a broad, balanced, conceptual and connected learning experience.
- Six transdisciplinary themes form the structure of the programme of inquiry.
- The themes capture human commonalities that are significant and relevant across cultures, geographic regions and student learning stages.
- A well-designed programme of inquiry ensures students gain a balance of subject-specific knowledge, conceptual understandings and skills, alongside opportunities to develop the attributes of the IB learner profile and to take action.
- Units of inquiry are collaboratively planned, developed and continually modified based on reflection with students.

Transdisciplinarity: a principle

Transdisciplinarity is a curriculum-organizing principle to offer students a broad, balanced, conceptual and connected learning experience. In order to engage students in transdisciplinary learning, schools create a programme of inquiry that maps the transdisciplinary themes students explore each year and throughout their time in the school. The programme consists of units of inquiry that span across, between and beyond subjects at each year level.

A well-designed programme of inquiry ensures students experience a balance of subject-specific knowledge, conceptual understandings and skills, alongside opportunities to develop the attributes of the IB learner profile and to take action.

The programme of inquiry is a long-term plan that provides students the opportunities to evolve their theories, address misconceptions and deepen understandings. Through the programme of inquiry, they build upon what they have learned in previous years, extending their understanding of the transdisciplinary themes as they revisit them throughout the early and primary years of education.

Transdisciplinary themes

The focus on transdisciplinarity as a means to integrate subject knowledge that transcends traditional subject boundaries in the Primary Years Programme (PYP) has been influenced by the work of Boyer (1995) on human commonalities, and the perspectives of Tye and Kniep (1991). This focus addresses challenges that crossed national boundaries, while being interconnected in the following ways.

- Culturally
- Ecologically
- Politically
- Economically
- Technologically

The six transdisciplinary themes capture human commonalities that are significant and relevant regardless of where students are in the world and to which ethnic or cultural groups they belong.

The transdisciplinary themes:

- have global significance—for all students in all cultures to explore the commonalities of human experience
- address contemporary opportunities and challenges surrounding environment, development, conflicts, peace, rights, and governance
- are supported by knowledge, concepts and skills from the subject areas but are not derived from them; in their scope, the themes transcend the confines of subjects
- are revisited throughout the students' years in school so that the result is wide-ranging, in-depth, articulated curriculum content
- contribute to the common ground that unifies the curriculums in all IB World Schools offering the PYP.

When learning is organized around transdisciplinary themes, authentic and meaningful connections are made across, between and beyond subjects. The iterative relationship between the learner, the learning community, and learning and teaching bring to life this transdisciplinary learning experience.

Transdisciplinary units of inquiry

The programme of inquiry consists of transdisciplinary units of inquiry that include:

- a central idea— the primary conceptual lens that frames the transdisciplinary unit of inquiry and support students' conceptual understandings of the transdisciplinary theme under which it is situated
- concepts—key and related concepts that support higher-order thinking and provide lenses for considering knowledge related to the central idea in a range of ways
- lines of inquiry—statements that define the potential scope of an inquiry.

Subjects play an important role in planning transdisciplinary units of inquiry. They can determine, support, enrich and connect learning.

To understand a central idea, or engage with particular lines of inquiry or learning experiences, knowledge conceptual understandings and specific skills from one or more subjects may be required to support and inform learning. This support may be planned for in advance, or developed within a unit of inquiry.

The integration of subjects within the programme of inquiry ensures that the expertise and collaborative effort of the learning community are integral to supporting students to construct, unite and transform knowledge. Schools have the flexibility to present the programme of inquiry horizontally and vertically or in any other manner they see fit.

Collaboratively designing a programme of inquiry

Collaborative planning starts by developing a shared understanding of what students will learn, based on the IB philosophy and what is considered as being significant for students as individuals, as a learning community, and as internationally minded citizens. Once broad understandings are reached, schools outline the content and process of learning and teaching, which include:

- a transdisciplinary programme of inquiry
- subject-specific scope and sequences
- planning for units of inquiry
- planning for subject-specific inquiry.

The six transdisciplinary themes provide a basis for discussion and integration of the PYP scope and sequences or national/state/local curriculums into the programme of inquiry. They scaffold the development and demonstration of international-mindedness and engage students with issues of personal, local, national and global significance as outlined in figure PO01.

Figure PO01: Transdisciplinary themes

Transdisciplinary themes	Description
Who we are	An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships,

Transdisciplinary themes	Description
	including families, friends, communities and cultures; rights and responsibilities; what it means to be human.
Where we are in place and time	An inquiry into orientation in place and time; personal histories; homes and journeys; the discoveries, explorations and migrations of humankind; the relationships between, and the interconnectedness of, individuals and civilizations, from local and global perspectives.
How we express ourselves	An inquiry into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values; the ways in which we reflect on, extend and enjoy our creativity; our appreciation of the aesthetic.
How the world works	An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.
How we organize ourselves	An inquiry into the interconnectedness of human-made systems and communities; the structure and function of organizations; societal decision-making; economic activities and their impact on humankind and the environment.
Sharing the planet	An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.

Developing a programme of inquiry

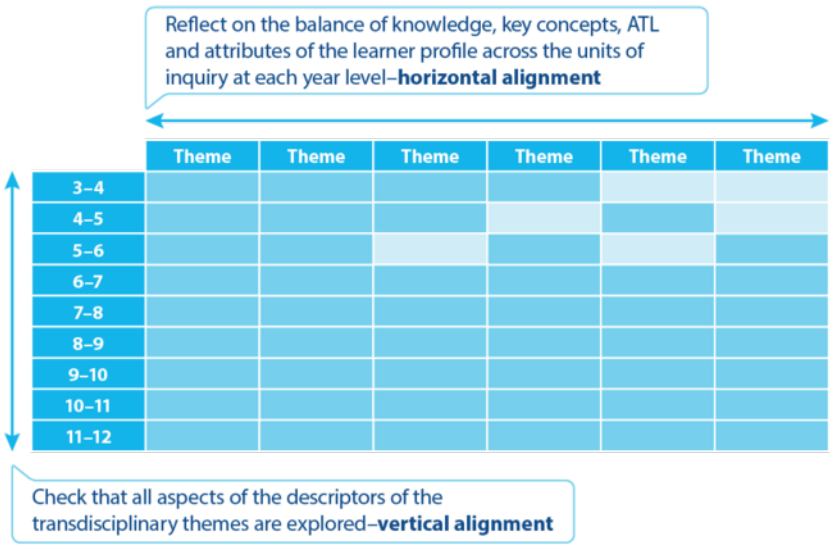
Each school's programme of inquiry is collaboratively developed to reflect the unique aspects of that school's community, from its geography to the needs and experience of its members. Following the PYP planning process, a collaboratively designed programme of inquiry builds a whole-school, long-term plan for learning based on its specific context. The programme of inquiry further ensures that students experience broad, balanced, conceptual and connected learning throughout their time in school. It considers and supports:

- transdisciplinary learning experiences
- scope and sequence guidance
- development of approaches to learning, learner profile and international-mindedness
- inclusion of all learners, their interests, cultural diversity and variability in learning
- learning within and beyond the learning community
- personal and collective action.

Schools can use a matrix to set out the full programme of inquiry (with each cell representing a unit of inquiry) or design their own way of organizing and presenting their programme of inquiry. The units of inquiry build on previous learning and are age-appropriate.

The proposed units of inquiry at each year level are articulated from one year to another (vertical alignment).

Figure PO02: Required number of annual units



Schools take a whole-school approach when developing, reviewing and refining the programme of inquiry throughout the year. It is the role and responsibility of the PYP coordinator to facilitate the planning process. This may involve a series of small-group meetings, and/or whole-staff meetings. Examples of how the process could work include the following.

- A core group of teachers develops a skeleton programme of inquiry that is then shared and fully developed with the rest of the staff.
- Groups of teachers develop units, either by age range or under each of the transdisciplinary themes. The whole staff then reviews the programme of inquiry to consider areas of redundancy or omissions.
- The whole staff works together all the way through the process to develop the complete programme of inquiry.

When developing a programme of inquiry, schools carefully consider their available resources, such as artifacts, people, places and technology. Additionally, consideration is given to the resources available in the local or virtual community—library, local councils, museums, businesses, professionals, websites, blogs, recordings and more—in order to provide a meaningful and authentic context for inquiry.

Schools organize and share the programme of inquiry to communicate the agreed learning taking place under the transdisciplinary themes. By doing this, the entire learning community sees how the programme of inquiry creates a vision for learning and supports development of the attributes of the learner profile.

TSM: Developing a programme of inquiry

Reviewing and refining a programme of inquiry

The development of a programme of inquiry is an ongoing process. Schools are required to systematically (at least annually) review and refine the programme of inquiry to look for opportunities to expand or adjust the scope of the central ideas to make them more substantial, interconnected and aligned with the scope and sequence documents or the local and national curriculum.

There are different processes that a school might use to collaboratively review its programme of inquiry. This process could include one or more of the following strategies.

- Arrange a meeting with all teachers at a specific time of year to reflect on and agree to changes.
- Post the programme of inquiry in a shared space on which members of the learning community can make comments and suggestions.

- Undertake a detailed analysis of the different aspects to check on balance and articulation of all elements, including the quality of individual units.

Any proposed changes that emerge as part of the review process are considered in light of the impact they might have on student learning and on the programme of inquiry as a whole. For example, some changes may have a significant overlap with units in other year levels or identified omissions may leave an aspect of the transdisciplinary theme under-developed.

Schools ensure balance throughout the entire programme of inquiry by:

- checking that all key concepts are represented at each grade/year level
- making sure that a balance of key concepts is used throughout each transdisciplinary theme
- cross-referencing between units to check for repetitions in central ideas and lines of inquiry
- checking that all aspects of the descriptors of the transdisciplinary themes are explored at some point
- mapping PYP and/or national/state/local subject-specific scope and sequence documents
- checking that all PYP subjects are represented at each grade/year level
- checking the balance of PYP subjects identified to support understanding of each transdisciplinary theme.

Evaluating a programme of inquiry

Reflecting on the integration of the units throughout the programme of inquiry provides evidence of its effectiveness. Teachers collaboratively reflect on the success of the programme and make ongoing modifications based on these reflections. Schools are encouraged to self-assess the programme of inquiry.

Collaboratively developing units of inquiry

A high level of collaboration is required when planning transdisciplinary units of inquiry. The planning teams, consisting of teachers, subject specialist teachers and students (where appropriate) plan the units together throughout the year.

All subjects are represented at each year level in the required units of inquiry. The school ensures balance and articulation between the programme of inquiry and any additional single-subject teaching (horizontal alignment).

Students inquire into, and learn about, globally significant themes through individual units of inquiry, each of which addresses a central idea relevant to the transdisciplinary theme. The following features will always be present in a unit of inquiry.

- A transdisciplinary theme
- A central idea, key and related concepts, and lines of inquiry

Figure PO03: Example of a unit in a programme of inquiry

Example of a unit on a programme of inquiry
Transdisciplinary theme: How we express ourselves
Central idea: People create messages to target or influence specific audiences.
Key concepts: function, perspective, responsibility
Related concepts: media, advertising, propaganda
Lines of inquiry
• How images, text and music are used to influence behaviour of target audiences
• Critical evaluation of messages presented in the media
• How people respond to messages

Central idea: The central idea is a statement that frames the transdisciplinary unit of inquiry. It provides teachers with a structure to introduce concepts that span across national, cultural and subject boundaries to support students' conceptual understandings of the underlining transdisciplinary theme. Central ideas

are globally significant and invite student inquiry. In developing or revising a central idea, consider the following questions.

- Does it offer students opportunities to explore the commonalities of the human experience?
- Does it promote the associated conceptual understandings?
- Is it broad enough to offer multiple lines of inquiry?
- Is it underpinned by concepts (for example, key and related concepts)?
- Is it relevant to students in all cultures and contexts?
- Will it engage students in thinking critically and creatively?
- Does it present an opportunity for students to co-construct meaning of the conceptual framework being explored?
- Is it open to a range of student responses?

The wording of a central idea can be analysed by the teachers and students over the duration of the inquiry and discussed using language that facilitates students' meaning-making. The development of central ideas requires time, careful thought and collaboration among members of the learning community, and, when appropriate, with students.

Concepts: Concepts are the means through which teachers develop the central ideas and through which students develop conceptual understandings.

Seven key concepts are identified: form, function, causation, change, connection, responsibility and perspective. Schools balance the key concepts across the programme of inquiry at each year level.

Multiple concepts can be explored in each transdisciplinary theme; therefore, schools are mindful of repetition or under-representation of concepts within a transdisciplinary theme. During collaborative planning, schools ensure that there are appropriate opportunities for students to revisit and develop their understanding of all concepts throughout the year.

A related concept deepens understanding of a key concept or a subject. As with key concepts, some related concepts have relevance across other subjects and provide further opportunities to make connections across, between and beyond subjects.

Lines of inquiry: Each unit of inquiry contains three or four lines of inquiry; these are written as statements or phrases. Refer to the example in figure PO03.

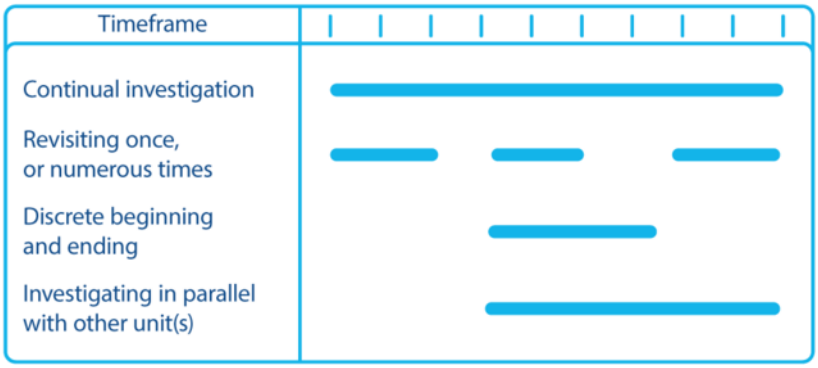
Do the lines of inquiry within each unit of inquiry:

- clarify and develop understanding of the central idea?
- define the scope of the inquiry and help to focus learning and teaching?
- remain distinctive, yet connected to one another, to support student understanding of the central ideas?
- invite student inquiries?
- provide opportunities for students to develop their understandings through multiple perspectives?
- relate to the experience of the students within a particular developmental range?

Length of an inquiry

Teaching teams have the discretion to decide an appropriate starting point and time frame for the length of each unit of inquiry in order to ensure they are age-appropriate and fit for purpose. An inquiry into a central idea considers the breadth and depth of the learning; therefore, a minimum duration of 3–4 weeks is recommended for each unit of inquiry.

Figure PO04: Units of inquiry time frames



TSM: Flexible times and timeframes

The PYP planning process and planners

Schools can either use one of the sample planner templates provided by the IB or develop their own planner template based on the planning process. Interconnected questions within these planner templates guide collaborative planning and reflection. All members of the teaching team collaboratively plan and reflect prior to the start of each unit, during implementation, and at the conclusion. Including students in the planning and reflection process is an important strategy to promote student agency.

Download PDF

Figure PO05: Collaborative planning for learning and teaching

TSM: PYP planner

The role of subjects

> Transdisciplinary involves, as a rule, disciplinary practice.
>
> Jahn, Bergmann and Keil 2012

Including specialists and members from the learning community to offer different perspectives into the inquiry process is a hallmark of the transdisciplinary model. Combining different subjects and perspectives enables lateral, imaginative and creative thinking about opportunities and solutions (Clark, Button 2011).

Whether subject knowledge is supported by the year-level teacher or specialist teacher, subjects are a means "to illuminate larger, more integrative ends" (Boyer 1995). Together, the transdisciplinary themes and the subjects represent ways of thinking about a broad body of knowledge that helps students inquire, discover connections and construct meaning.

Through the integrated subjects, students come to appreciate that there is a body of subject-specific knowledge, conceptual understandings and skills that can be drawn upon in order to engage with global challenges and opportunities. Students investigate the logic of mathematics, appreciate the complexity of arts, play with language, enjoy physical activity, wonder at the natural and physical world, and celebrate the diversity of their social worlds.

Teachers facilitate students' understanding of, and making connections between, the subjects by:

- identifying authentic opportunities for thinking and responding like historians, athletes, artists, scientists, and so on, within a unit of inquiry
- recognizing and responding to events that arise spontaneously by using subject-specific knowledge to enhance understanding

- exploring questions from multiple subjects when possible
- helping students to make connections and recognize opportunities to transfer learning from one subject to another
- ensuring learning is purposeful and connects subject-specific learning goals to real-life challenges and opportunities.

Promoting transdisciplinary learning across, between and beyond subjects involves the following (see figure PO06).

Figure PO06: Transdisciplinary learning across, between and beyond subjects

Moving from	Moving towards
Subjects as collections of related facts and isolated skills	Subjects as collections of key and related concepts, skills, theories, methodologies and examples that contribute to an understanding of how a subject connects to the central idea
Stand-alone subjects as the sole driver for learning	Subjects as part of transdisciplinary learning
Teaching subject-specific lessons in isolation from the unit of inquiry	Making connections between one subject and another in planned, spontaneous or incidental ways through units of inquiry
Subject-specific knowledge, conceptual understandings and skills viewed through the lens of age-specific development	Assessing prior knowledge and the needs of students before the selection of subject-specific conceptual understandings, knowledge and skills
Measuring students' abilities within a subject only	Monitoring, documenting and measuring students' capacity to understand and apply subject-specific knowledge, conceptual understandings and skills within authentic contexts

Supporting subject knowledge and skills acquisition

Learning begins at home and within the various communities to which students belong. Young students come to school with their own experiences, theories and capabilities. While a student's prior knowledge may align with the subjects identified by the PYP, young students do not experience the world through these lenses. Instead, they learn from their environments, people around them, seeing experts at work, questioning and reflection, with little need for specific knowledge instruction (Gardner, Boix Mansilla 1999). It is, therefore, important to acknowledge the prior knowledge and experiences of all of students in the unit of inquiry to support learning that is connected to their worlds. Teachers prioritize purposeful learning over subject knowledge acquisition by building on the wonderings of students inside and outside the programme of inquiry.

There are a number of ways teachers can facilitate the acquisition of knowledge.

Transdisciplinary unit of inquiry: Learning and teaching of subject-specific knowledge, conceptual understandings and skills is included within the school's programme of inquiry whenever possible and appropriate. Using the PYP planning process or planners, the teaching team integrates the subjects seamlessly into the units of inquiry.

Subject-specific inquiry: There are times when teachers will teach subject-specific knowledge (such as language conventions and order of operations in mathematics), conceptual understandings and skills outside the programme of inquiry using purposeful inquiry. The teaching team uses the planning process or planners to structure and plan for this type of inquiry to ensure that authentic connections are made with programme elements while maintaining the integrity of the subject.

Preparing for, or following on from, a unit of inquiry: The direct teaching of subject-specific knowledge, conceptual understandings and skills in a unit of inquiry may not always be feasible but, where appropriate,

introductory or follow-up learning experiences may be useful to help students make connections across the curriculum. Teachers plan and teach learning experiences that prepare the students to participate in a unit of inquiry. Following on from a unit of inquiry, students may extend a subject-specific related interest into another line of inquiry.

Skills-based teaching: This refers to the teaching of subject-specific skills not directly related to units of inquiry but to support mastery and increase students' skills base in areas such as literacy, numeracy, arts and physical, social and personal education (PSPE). While these skills might be developed outside the programme of inquiry, teachers are mindful that subject-specific skills contribute towards the exploration of the programme of inquiry. Furthermore, teachers continuously monitor, document and measure progress in order to effectively support the mastery of subject-specific skills through grouping and regrouping.

Subject-specific scope and sequences

Determining a whole-school vision for learning involves an ongoing process of curriculum mapping. The IB has developed a suite of subject-specific guidance, called PYP scope and sequence documents, for optional use by schools. Language, mathematics, science, social studies, arts, and PSPE are the key subjects of the PYP curriculum. These documents contribute to an understanding of particular subjects. As well as documenting subject-specific content (knowledge and conceptual understandings), each scope and sequence document offers learning continuums for different phases of development.

The content of a school's scope and sequence documents may be partially or wholly mandated by a local, state or national authority, or they may be determined by the school itself. Schools may adopt or adapt the PYP scope and sequence documents if they are in a position to do so. Teachers map the curriculum using these scope and sequence documents inside and outside of their school's programme of inquiry.

Together, the programme of inquiry and scope and sequence documents articulate what the school has agreed are the best possible learning opportunities to achieve the knowledge, conceptual understandings and skills of the subjects as well as the overall learning outcomes of an IB education.

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Assessment in the Primary Years Programme

Summary

- Assessment is an ongoing process of gathering, analysing, reflecting and acting on evidence of student learning to inform teaching.
- Assessment involves teachers and students collaborating to monitor, document, measure, report and adjust learning.
- Students actively engage in assessing and reflecting on their learning, acting on feedback from peers and teachers to feed forward to next steps in learning.
- Fostering an assessment culture involves the development of assessment capability among all members of the learning community.
- Learning goals and success criteria are co-constructed and clearly communicated
- Both learning outcomes and the learning process are assessed.
- Assessment design is both backward and forward looking.

Integrated assessment

All IB programmes are informed by assessment, as indicated in the IB approaches to teaching. While assessments look different in each programme, all IB assessment methods are varied and fit for purpose.

Assessment is central to the Primary Years Programme (PYP) goal of thoughtfully and effectively supporting students through the acquisition of subject-specific knowledge and skills, the understanding of concepts and the development of approaches to learning.

The development of knowledge, conceptual understandings and skills requires that both teachers and students demonstrate assessment capability.

Purpose of assessment

The purpose of assessment is to inform learning and teaching. It involves the gathering and analysis of information about student learning to inform teaching practice. It identifies what students know, understand and can do at different stages in the learning process.

Effective assessment that achieves this purpose provides valuable information to understand what constitutes learning and how to support it, and is meaningful to all members of the learning community.

Students become effective, self-regulated learners when they are actively engaged in assessment and act on constructive feedback. This helps them reflect on their progress, set goals for their learning and engages them in making decisions about what they need to do to achieve these goals.

Teachers become more effective when they continually learn about what students know and can do. They reflect on their practice, adjust their teaching based on data, and offer timely, specific and well-considered feedback to better support learning.

Parents and legal guardians become more informed when they understand the learning goals their child is working towards, and the progress their child is making. They extend their child's understanding and development of skills when they support learning. They contribute to their child's joy of learning and growth as a successful learner through sharing insights with the learning community.

Schools become more impactful learning communities when they use assessment as a tool to evaluate the depth of their curriculum and the effectiveness of their teaching. They make decisions about targeting resources and support to the most pressing priorities and professional development needs.

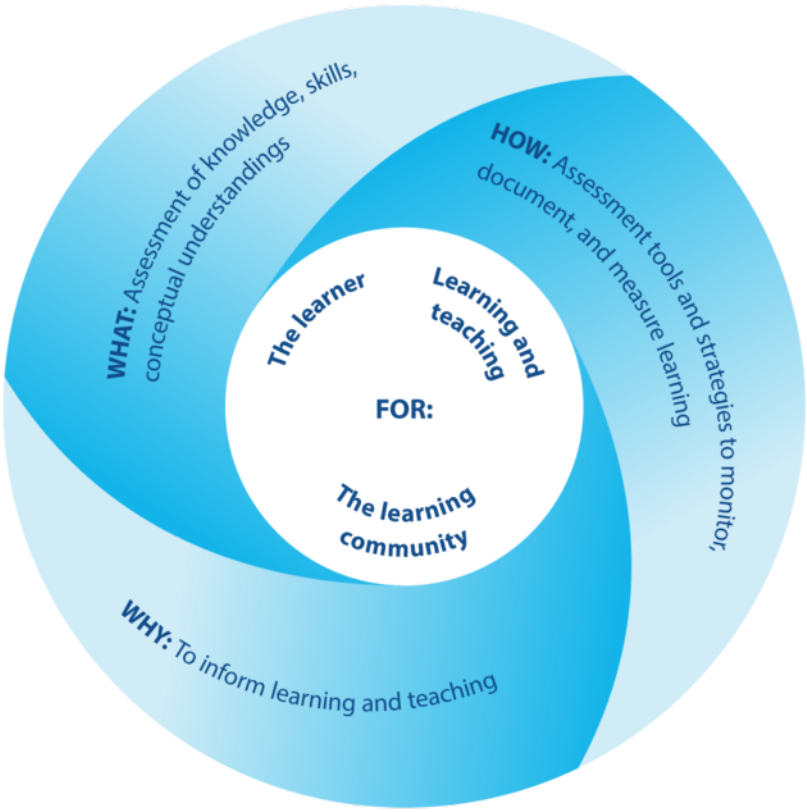
Characteristics of effective assessment

Highly effective assessment shares some key characteristics (Adapted from Clarke 2012).

- **Authentic:** It supports making connections to the real world to promote student engagement.
- **Clear and specific:** This includes desired learning goals, success criteria and the process students use to learn.
- **Varied:** It uses a wider range of tools and strategies that are fit for purpose in order to build a well-rounded picture of student learning.
- **Developmental:** It focuses on an individual student's progress rather than their performance in relation to others.
- **Collaborative:** It engages both teachers and students in the assessment development and evaluation process.
- **Interactive:** Assessment encompasses ongoing and iterative dialogues about learning.
- **Feedback to feedforward:** It provides feedback on current learning to inform what is needed to support future learning (Hattie, Timperley 2007) and raises students' motivation.

The PYP approach to assessment gives the students a vital role in the assessment process and engages the teachers in considering assessment as fit for purpose. Effective PYP assessment practice holistically integrates assessment for, of and as learning (Harlen, Johnson 2014) to support effective learning and teaching.

Figure AS01: Integrating assessment



PYP assessment informs the learner, learning and teaching, and the learning community through the monitoring, documenting and measuring of learning.

Developing an integrated assessment culture

Strong communication, of the purposes of assessment and reinforcement of the value of assessment in the monitoring, documenting, measuring and reporting of learning, is important in building a shared assessment culture. A school-wide assessment culture acknowledges the role assessment plays in informing the learner, learning and teaching, and the learning community about achievement, progress and in supporting decision-making.

Establishing and fostering a school-wide culture around assessment begins by:

- developing assessment capability within the learning community
- developing a comprehensive assessment policy that emphasizes assessment integration
- creating opportunities for teachers to plan, reflect and moderate assessment collaboratively
- providing school-wide professional development opportunities around integrating effective assessment
- reinforcing the role assessment plays in finding out what students know and can do, and in identifying the next steps for their learning
- reinforcing the links between monitoring, documenting, measuring and reporting of learning.

Developing assessment capability to support learning

All members of the learning community develop assessment capability (Absolum et al. 2009) to make the "tacit knowledge that is 'hidden' within the learner transparent, explicit and available" (Clark 2012).

Members of the learning community are assessment capable when:

- everyone is aware of, and understands, why and what to assess
- everyone is aware of, and understands, what constitutes quality
- there is a shared understanding of how to assess and what data is being collected, analysed and reported.
- there is a shared language for talking about assessment
- the assessment process is collaborative and inclusive of all members

(Hipkins 2009; Booth, Hill, Dixon 2014)

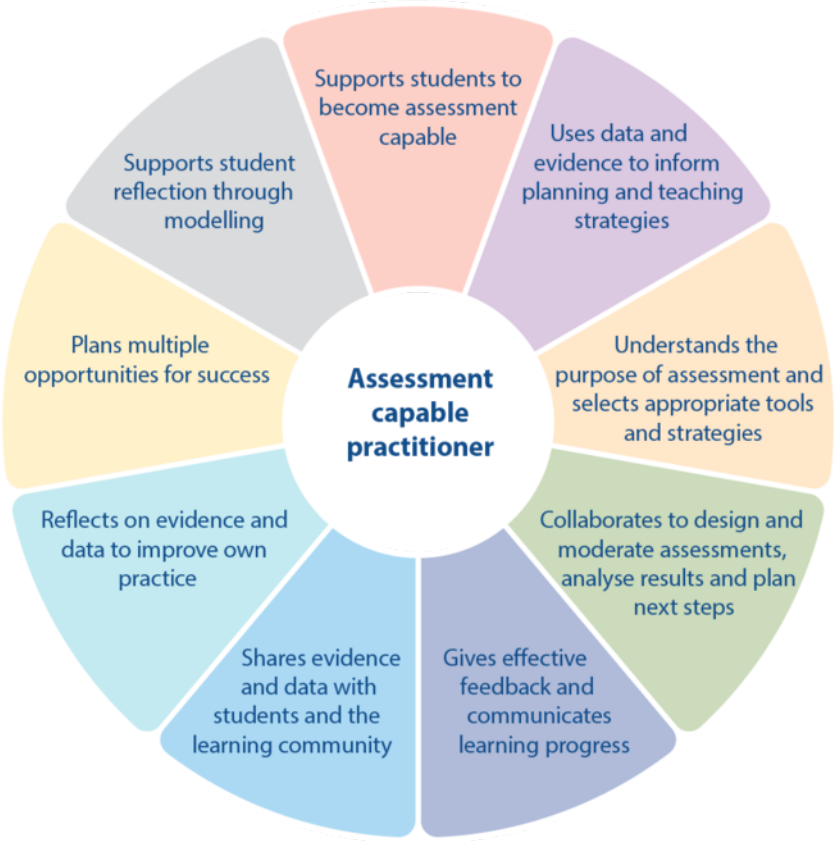
When members of the learning community have a shared understanding and language to monitor, document and measure learning, they can make powerful contributions to learning and teaching.

In an assessment-capable learning community, everyone has a clear understanding of the reasons for assessment, what is being assessed, the criteria for success, and the methods by which the assessment is made. In so doing, the entire school community is involved in the inquiry regarding the efficacy of the programme implementation (Hipkins 2009). This could have a powerful effect on the development of knowledge, conceptual understandings and skills.

Teachers

An assessment-capable teacher is supported through professional development and a shared assessment culture. As indicated in figure AS02, teachers support students to become assessment capable in the following ways.

Figure AS02: Assessment-capable teacher



Teachers become more effective when they are open to actively learning about student progress by monitoring what they know, understand and can do. Teachers inquire into student learning as a way of assessing their own practice as educators. They continually adjust their teaching to better support individual and group learning.

Teachers in a learning community ask the following questions.

- What awareness and understanding do we have of student learning?
- What is the evidence of what students can do, say, write, create and demonstrate?
- How do we support students to understand what constitutes quality?
- What other contexts can we provide for students to practise their skills?
- What action needs to be taken to develop the learning further?
- How will we know that we have sufficiently supported student learning?
- How can we identify progression in learning across multiple contexts or units of inquiry?
- How do we use evidence of learning to plan the next learning steps with students?

Students

Students develop assessment capability when teachers provide them with multiple supported experiences in reflecting on their learning and how to make improvements. Using specific language to describe, discuss and evaluate learning, students demonstrate their assessment capability by:

- partnering with teachers to design their learning goals and success criteria
- being able to self-assess and discuss their progress towards achieving learning goals

- selecting evidence, such as samples of their learning, that best demonstrate the intended learning goals
- developing the metacognitive skills to reflect on their learning and to plan next steps
- drawing on feedback and multiple strategies to adjust their learning and identify where and when to make improvements.

TSM: Supporting student agency

From self-assessing to self-adjusting

By taking an active role in their own assessment, students analyse how they think and learn. They develop skills to move from being self-assessors to self-monitors, with the aim of becoming self-adjusters.

Self-assessment involves students reviewing and evaluating their knowledge, conceptual understandings and skills. It then leads to students monitoring and adjusting their behaviour and planning, making corrections and implementing improvements in their learning. Self-adjusters use the feedback they are given to modify and improve their learning. Self-adjusting therefore requires both thought and action and supports students' self-efficacy.

Assessment is a powerful tool to support students in becoming self-adjusting learners. As they reflect on their progress and set goals for future learning, they may consider the following questions.

- What do I need to know?
- What knowledge and skills do I need to develop in order to answer my questions?
- What steps do I need to take to ensure that my learning exemplifies quality?
- What further possibilities do I see?
- How do I incorporate feedback to achieve my learning goals?

Co-constructing learning goals and success criteria

Students and teachers set and reset learning goals to answer the questions "Where am I going in my learning?" and "What do I need to get there?" These are personalized for each student and connect new learning to prior learning. Learning goals are revisited throughout the learning process to monitor progress.

In PYP schools, personal learning goals support the creation of high expectations by:

- making learning transparent to the teacher, the student and their families
- building a shared understanding of what learning is to be achieved
- encouraging reflection and focused feedback
- inviting students to take ownership of their own learning.

Success criteria describe what quality and achievement will look like. They are specific and measurable. Students and teachers co-construct success criteria to answer the questions "What does successful learning look like?" and "What are we looking for during learning?"

Co-constructed success criteria support learning by:

- building a common understanding of what constitutes quality
- allowing for specific feedback on learning and feed forward into next steps of learning
- providing the structure and language for reflection, self-assessment and peer feedback
- providing the criteria against which learning is measured.

Young students' learning is measured against individual developmental milestones and celebrates achievements at times that are pertinent to them. Students in the early years learn about the role of learning goals and success criteria over time. Teachers support students' development of goal and success criteria setting skills by modelling the skills and by offering multiple opportunities for students to practice them.

Designing assessment to inform learning and teaching

> There are no year level expectations in a series of achievement standards. No one is at, on, above or below expectations. Every student is simply at a level of development defined by what learning is developmentally appropriate.
>
> (Griffin 2009)

Griffin 2009

Assessment in the PYP has generally followed the "backwards by design" process (Wiggins and McTighe, 2005). This assessment philosophy encourages teachers to design assessment by first identifying the desired knowledge, conceptual understandings and skills, followed by the design of the assessment, and finally planning learning activities to ensure acquisition of knowledge, conceptual understandings and skills.

"Forward by design" takes into consideration what other learning may have occurred beyond what has been planned. This design approach supports the development of "soft" skills, that are not immediately measurable, and that can emerge through the learning process. Forward by design is particularly relevant in supporting the development of approaches to learning and for the learner profile. This encourages student participation in assessment design, inviting them to evidence what else they know or can do.

In the PYP inquiry learning environment, the learning process is valued as much as the learning outcomes. Designing assessment that are both backward by design and forward by design will ensure that knowledge, conceptual understandings, skills and attributes of the IB Learner profile are monitored, supported and valued.

In designing a holistic assessment, teachers consider the following questions.

- What learning goals will be achieved?
- How can I involve students in the assessment design?
- How could students engage in dialogues with teachers about the development of learner profile attributes?
- What data or evidence should be gathered?
- What tools or strategies should be used to gather data?
- How will the evidence be monitored, documented and measured?
- How could students be asked to evidence any additional learning?
- How will the results be shared to feed back to the student?
- How will the results be used to inform next steps in learning and teaching?
- How will the results of the assessment be used to inform the learning community?

What to assess

The significant content identified by the school supports the outcome of students becoming internationally minded. Once this content is identified, teachers plan multiple opportunities for their students to develop knowledge, conceptual understandings and skills to support self-regulatory learning. In determining what to assess, teachers might ask the following questions.

- Is it the process or product of learning we aim to evaluate?
- Is it to understand prior knowledge—what the student already knows and can do?
- Is it to check if learning is on track or if the student is ready for extension?
- Is it to elicit depth and breadth in understanding?
- is it to extend students' learning?
- Is it to understand how the student makes connections and applies learning?

The criteria for assessment must be known to students at the beginning of the inquiry and should be documented in one of the PYP planners, an adapted planner or the PYP planning process. The criteria accommodate a wide range of knowledge, conceptual understandings and skills. They are revisited and modified during the course of the inquiry, ensuring that they also reflect emergent knowledge, understandings and skills.

Note: the revised PYP outlines a planning process which schools can follow. They have the flexibility to not use a planner, PYP or adapted, as long as all the elements are documented accordingly.

Inquiry

PYP assessment recognizes the importance of monitoring and documenting the process of inquiry. Through careful observation of the inquiry process, teachers monitor students' ability to make connections across subjects and to apply skills to construct new knowledge.

When monitoring and documenting student learning, the teacher considers:

- the nature of students' inquiry over time—observing for depth and breadth
- students' awareness that authentic challenges require solutions based on the integration of knowledge that spans and connects different subjects
- how students demonstrate and develop subject knowledge
- how students apply their conceptual understandings to further their inquiries successfully
- how students demonstrate and develop the approaches to learning
- how students demonstrate both independence and an ability to learn collaboratively.

Conceptual understanding and approaches to learning

Monitoring, documenting and measuring conceptual understandings focus on how concepts are recalled, explained, applied and transferred through a range of learning experiences. Skills are monitored and documented for growth over time; they manifest at different points in time and in different ways, are closely interconnected and are open to interpretation. It is, therefore, important that teachers allow for flexibility to monitor and document conceptual understandings over time.

TSM: Solo taxonomy

Progress in conceptual understandings is evident when:

- the use of abstract concepts increases
- connections are made between multiple concepts to explore the central idea
- understandings are transferred to more complex contexts
- actions are informed and taken based on existing and new understandings of the central idea.

Students increase their depth of understanding through adding to, expanding on, testing and adjusting their ideas. Strategies to support conceptual understandings include the following.

- Increase **wait time** strategy for students to answer questions so they can move beyond factual understanding to make connections and discuss deeper understandings*.
- Encourage students to use and add to **concept maps** to show connections and relationships between concepts.
- Use **exit cards** strategy for students to list their understandings of the concepts and questions they may still have.
- Use the **bus stop strategy** to post concepts around the learning space. Students individually or collaboratively record, challenge, expand or add their ideas using symbols or words as they move around the "bus stops".
- Provide opportunities for students to **think in pairs or small groups** to encourage deeper discussions.
- Ask **open-ended questions**: For example, "What do you think?", "How could you change the issue?", "What other alternatives are there?".

*(Sackstein 2016)

Supporting self-regulated learning

Assessment is a powerful tool to support lifelong learning. Whenever and wherever possible, teachers provide opportunities for students to practise self-assessing and self-monitoring so they can internalize their own learning and develop strategies to adjust their learning. To develop students' assessment capability, teachers:

- are mindful of the well-being of students to ensure self-assessment promotes a positive sense of agency and self-efficacy
- provide timely, specific and well-considered feedback that students can act upon
- provide students with opportunities to experience success
- challenge students to take risks to extend their learning
- challenge students when there are misconceptions or misunderstandings so they can self-correct
- support students in viewing mistakes as learning opportunities.

Students and teachers are actively engaged in assessing students' progress as part of the development of knowledge, conceptual understandings and skills. Recognizing that self-regulated learning is not a fixed personality trait (Clark 2012) and that students learn in diverse, complicated and sophisticated ways, teachers call on a variety of strategies and tools to support assessment of students' work.

Teachers:

- provide multiple opportunities and contexts for students to practise their skills
- clearly define and communicate learning goals and success criteria with students and parents
- design guided and open-ended learning experiences that allow for a range of opportunities to demonstrate skills in different contexts
- collect and use observable learning evidence that can be seen, heard or touched
- identify where and when students are most ready to learn and be challenged.

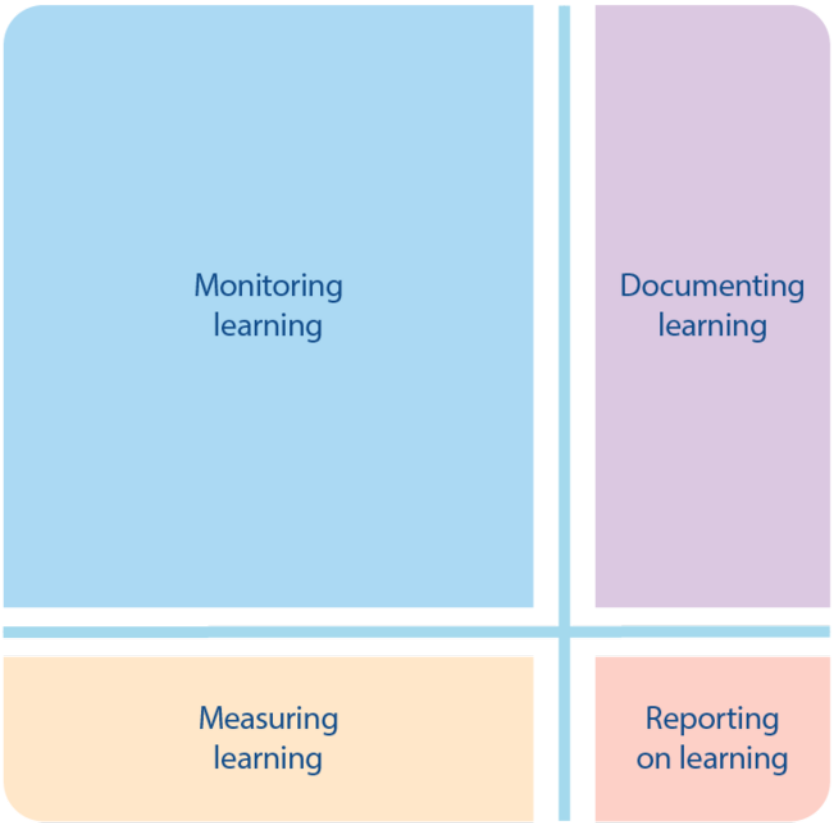
How to assess

The four dimensions of assessment

Assessment provides evidence to inform learning and teaching. Both students and teachers are continually asking themselves the questions "Am I making progress? How do I know?" They gather evidence of learning to answer these questions.

PYP assessment has four dimensions: monitoring, documenting, measuring and reporting on learning. Each of these aspects has its own function, but all aim to provide evidence to inform learning and teaching. Although the four dimensions of assessment are not weighted the same; each dimension has its own importance and value. The PYP chooses to put emphasis on monitoring and documenting learning as these dimensions are critical in providing actionable feedback for the learner.

Figure AS03: Assessment to inform learning and teaching



Monitoring learning

Monitoring of learning aims to check the progress of learning against personal learning goals and success criteria. It occurs daily through a variety of strategies: observation, questioning, reflection, discussing learning with peers and teachers, and well-considered feedback to feed forward for next steps in learning. Tools used for monitoring include open-ended tasks, written or oral assessment, and a learning portfolio.

Documenting learning

The documenting of learning is the compilation of the evidence of learning. Documentation can be physical or digital, and can be displayed or recorded in a variety of media forms. Documentation of learning is shared with others to make learning visible and apparent. It reveals insights into learning and provides opportunities to reconnect with learning goals and success criteria.

Students and teachers can document learning goals, questions, reflections and evidence of learning using a variety of formats.

- **Learning logs or journals:** These are used to record feedback and reflections of ongoing learning.
- **Learning stories:** Narratives that document an instance when the learner shows knowledge, conceptual understandings or skills.
- **Portfolios:** A collection of artifacts that can also contribute to reporting.

Documentation tools could include exemplars, checklists, rubrics, anecdotal records, portfolios.

Measuring learning

The measuring of learning aims to capture what a student has learned at a particular "point in time". Not all learning can be, or needs to be, measured. Measurement tools can be school-designed or commercial, but each measurement tool used provides further data to support a larger picture of student achievement and progress in learning.

Some IB World Schools may administer government or commercially available standardized tests to measure their students' performance. When standardized achievement tests are used, administrators and teachers are encouraged to carefully consider:

- how to minimize the impact of testing on student well-being
- how to effectively use this data point to add to the comprehensive view of student learning.

Analysing learning

Teachers use multiple data points to evaluate student progress. The aim is to organize, aggregate and disaggregate data to derive information to support evidence-based decision-making. The PYP supports collaborative analysis of data undertaken for individual learners, student cohorts and across the school to identify patterns and trends in student learning. The outcome of this analysis informs and guides decisions about learning and teaching.

Teachers use a range of assessment tools and strategies to compile the most comprehensive picture of student progress and achievement over time. This includes the participation of the student within the process, which builds their assessment capability. Each tool and strategy chosen provides the learning community with accurate and accessible data on each student's learning.

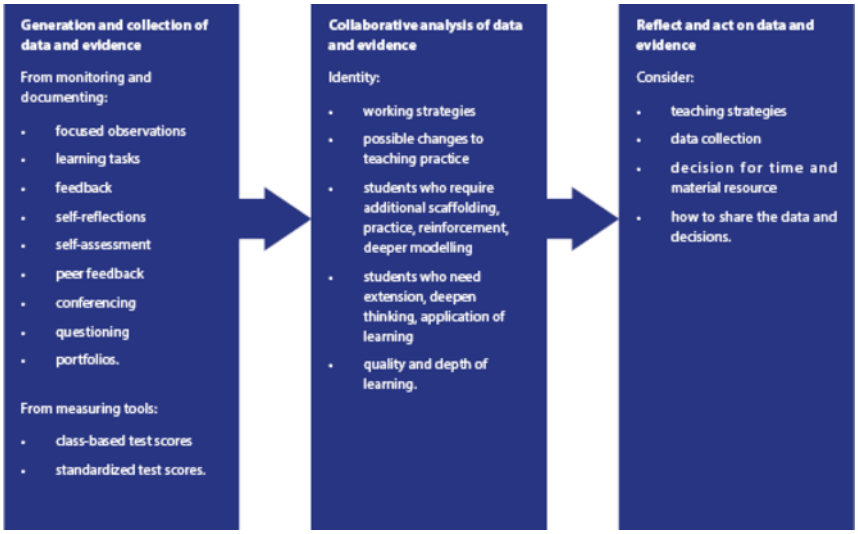
Teacher moderation

It is necessary to have a shared understanding of what quality and success looks like for diverse learners before, during and after learning. Teacher moderation through professional discussions around student samples is an effective strategy.

After any documenting and measuring of learning is complete, teachers collaboratively ask further questions.

- Have the learning experiences provided ample information to allow an evaluation to be made about whether the purposes or learning goals have been met?
- What does a student's performance reveal about their level of understanding?
- Have any unexpected results occurred?
- How could the learning and teaching process be modified as a result of the assessment?
- Should any changes be made to the assessment design or procedure?

Figure AS04: Data-informed decision-making



Reporting learning

Reporting on learning informs the learning community and reflects the question "How well are we doing?" It describes the progress and achievement of the students' learning, identifies areas for growth and contributes to the efficacy of the programme. Reporting is perhaps the most public aspect of assessment, and therefore needs careful consideration in order to provide clear information that is useful to students and parents. If a school awards and communicates grades or other indicators of achievement, it should ensure that these processes are open, transparent and understood by all stakeholders.

No specific formats are preferred by the IB for reporting. The following ways have been used by schools offering the PYP that may be considered or adapted.

- Parent/teacher/student conferences
- Student-led conferences
- Reports
- Learning progressions

Self-audit framework for teachers: Integrating assessment

Assessments are designed to produce data and/or evidence of learning and teaching. This optional tool offers considerations, when designing assessment for knowledge, conceptual understandings and skills, both individually and with collaborative planning teams.

Figure AS05: Self-audit framework for teachers: Integrating assessment

	Conceptual understandings	**Skills**	**Knowledge**
Monitoring learning			
The monitoring of learning occurs daily through a variety of strategies: observing, questioning, reflecting, discussing, and learning with peers and teachers to form meaningful	What conceptual understandings am I planning for and monitoring? How will my students know the purpose of monitoring learning?	How am I modelling the skills I want my students to build? How am I monitoring the skills I want my students to build?	What relevant prior knowledge might my students already have? How do I plan to find out?

	Conceptual understandings	Skills	Knowledge
feedback and feedforward for next steps in learning.			
Documenting learning			
The documenting of learning is shared with others to make learning visible and apparent. It reveals insights into learning and provides opportunities to reconnect with learning goals and success criteria	How am I documenting feedback and reflection on new understandings? How am I using this information?	Are/how are my students identifying connections to others learning and prior experience? In what ways are my students and I documenting skill developing?	How have my students and I identified and documented their learning?
Measuring learning			
The measuring of learning gathers "point-in-time" data on achievement and progress. Not all learning can be, or needs to be, measured.	How have I given multiple opportunities for my students to access, use and demonstrate new understandings?	How might my students use their strengthened skills in other contexts? What will support them to do so?	Have I got the right balance between challenge and knowledge? How do I know?

Assessing early learners

Students in the early years acquire key learning milestones that are fundamental for future school success. This includes their cognitive ability to reflect on their knowledge, conceptual understandings and skills. A wide range of assessment strategies informs learning and teaching of young learners.

Early years teachers observe how students monitor and adjust their own behaviour, especially at play, in order to:

- build a clear picture of the student and their interests
- identify what and how the student is thinking and learning
- assess the effectiveness of the learning environment on the student's learning
- plan learning engagements for individuals and small groups.

When observing, teachers also document what the students say and do. By listening carefully to the dialogue between students, teachers learn about their current interests, existing knowledge, level of involvement and social skills. Teachers share these observations with students and parents. Collaborating with colleagues, they analyse group interactions, discover strengths, identify learning goals and reflect on the effectiveness of teaching practices.

Giving and receiving feedback

Feedback has been identified as one of the most effective teaching practices (Hattie, Timperley 2007) and should, therefore, form the core of assessment. Effective teacher feedback offers opportunities for reflection and action. It encourages learning adjustment, promotes continuous improvement and celebrates success. Effective feedback is timely, specific and well considered to provide students with opportunities to practise metacognitive skills (Booth, Hill, Dixon 2014). It helps students develop strategies to self-adjust and has a powerful influence on engagement and self-efficacy towards learning.

In providing feedback, teachers may also consider whether to focus on knowledge or skills, on the learning process or on self-regulation skills (Hattie 2012). All three types of feedback are necessary; however, students benefit most from feedback that is based on their learning progression. For example, a learner who is learning a skill for the first time might require more feedback relating to that skill or knowledge. At the same time, another learner who has had multiple opportunities to practise that skill will benefit from feedback relating to self-regulatory skills (Hattie 2012).

Feedback on knowledge, conceptual understandings and approaches to learning supports students moving towards their desired learning goals. When giving feedback, teachers should therefore focus on:

Feed**back**: How am I doing?

Feed**forward**: Where to next?

(Hattie and Timperley, 2007)

Figure AS06: Feedback and feedforward

Teacher feedback can also aim at challenging students' reflection on misconceptions. Supporting students' correction of misconceptions removes potential barriers to learning and enhances deeper conceptual understanding (Hattie 2012).

Peer feedback

Peer feedback is a key activity through which students use the structure and language of success criteria to appraise and provide feedback on the learning of others. It emphasizes the importance of learning in the context of relationships by providing opportunities to communicate and be listened to. Peer feedback contributes to learning adjustment because:

- it is given in language that students naturally use
- students are more ready to accept feedback from one another.

(Black et al. 2004)

Students who provide feedback to peers also benefit: in giving feedback, they increase their assessment capability. Peer feedback also gives teachers information about how a student's understanding of a learning experience is similar to, or different from, their peers.

To support this, teachers model how to provide effective peer feedback by:

- using language that shows respect for the learning of others
- referring to shared understandings of what quality and success looks like for diverse learners
- providing authentic and ongoing experiences in giving meaningful feedback
- supporting students to interact with the learning of others
- conferencing in small groups.

Further reading

Types of assessment

While school accountability reforms in many countries have put a spotlight on standardized assessments, education scholars are increasingly calling attention to the need to focus on assessment that connects student learning in a meaningful way (Stiggins 2002; Absolum et al. 2009). Firm evidence supports the efficacy of assessment **for** learning and assessment **as** learning on student outcomes, for they are an essential component of what students and teachers do in the classroom (Black, Wiliam 2010).

The three assessment practices—for learning, of learning and as learning—serve different purposes. Of these practices, assessments for learning and of learning strongly align with the centrality of the PYP inquiry process and can support students' cognitive, social emotional and behavioural development (Harlen, Johnson 2014). These practices may be formal or informal and internal or external. PYP students' learning is evaluated through a combination of these practices.

Figure AS07: The three assessment practices

	Assessment for learning	Assessment of learning	Assessment as learning (Clark 2012; Earl 2012)
Purpose	Also known as formative assessment. Its goal is to inform teaching and promote learning.	Also known as summative assessment. Its goal is to certify and to report on learning progress.	As part of the formative process, its goal is to support students in learning how to become a self-regulated lifelong learner.
Timing	It is conducted throughout the learning process. It is iterative and interactive.	It is typically conducted at the end of a unit, year level or developmental stage, or programme.	It is conducted throughout the learning process. It is iterative and interactive.
Features	Student involvement Quantitative and qualitative data Written and oral artifacts Observations and feedback Questionnaires Teacher/student dialogues/ conferences Context-based Informal Indication of process Indication of knowledge/skill application	Limited student involvement Quantitative data Tests, exams, standardized tests Indication of skills and knowledge acquisition or mastery Based on teacher judgment Norm- or criteria-referenced	Students are active agents in their own learning by developing and using meta-cognitive strategies to: • plan learning goals • monitor goals • reflect in order to modify learning and to adjust learning.

Assessment for learning is learner-centred, forward thinking and involves the entire learning community. It is a collaborative effort that starts with assessment of prior knowledge to determine what students already know and what they are able to do with further guidance (Griffin 2014). Using pre-assessment data,

teachers design opportunities for students to test and revise their models, and support them in making connections between their previous and current perceptions.

Assessment produces evidence of student learning. Continuously monitoring, documenting and measuring learning, and then analysing assessment data, provides insights into students' understanding, knowledge, skills and dispositions. Assessment is a means for teachers to personalize learning and for students to self-adjust based on emerging data and feedback from teachers and peers.

Assessment as learning promotes learning by helping students to take responsibility, while developing enthusiasm and motivation for their learning. By encouraging students to actively design, manage and measure their own learning, they develop the skills to use assessments to self-assess, to reflect on and to make adjustments in future learning.

Assessment of learning is an integral part of learning. At appropriate points of the inquiry, it provides students with the opportunity to gauge their acquisition of knowledge, development of conceptual understandings and skills during the inquiry.

Assessing understanding using SOLO

Many taxonomies outline the different levels of knowing and thinking, and can be used to design learning experiences and measurement tools for a deeper level of thinking. The structure of observed learning outcomes (SOLO) taxonomy (Biggs and Collis 1982) outlines five levels of thinking: one level where students have no prior knowledge or understanding, two surface levels of knowledge and two deeper levels of thinking (conceptual understandings). This model can be used to develop rubrics, observations, design learning experiences, and assessment tasks. Students require opportunities to acquire both surface and deep knowledge equally.

TSM: Solo taxonomy

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Language in the PYP

Summary

- Language learning includes the development of home and family languages, languages of the school, additional languages and literacy.
- Language is a means of affirming and expressing cultural identity and developing international-mindedness.
- Multilingualism benefits learns and the learning community in a variety of ways.
- Schools provide students with multiple, authentic opportunities to learn language, learn about language and learn through language.
- The student language portrait is a tool that captures a learner's complex language profile.

Language development

The development of language is fundamental to the instinctive human need to communicate. Language learning includes the development of the home and family languages, the languages of the school, additional languages and the development of literacy. This is integral to exploring and sustaining cognitive and personal development and cultural identity. Language learning and teaching are social acts, dependent on relationships with the self and others, with context, with the environment, and with the world. The Primary Years Programme (PYP) beliefs and values about language are embedded implicitly throughout the learner profile and explicitly through the attribute of "communicator", as well as in the IB's approaches to learning. Through an IB education, PYP learning communities use language to build a better and more peaceful world.

A culture of language learning is foundational to a PYP learning community. Language has the power to bring the learning community closer together and overcome boundaries. It excites and invites communication in many ways, supporting and strengthening relationships and the building of international-mindedness. Language learning is located in both local and global communities. Students are able to flourish in an interconnected, mobile global community using technologies to communicate and sustain relationships. At the same time, they are rooted in local communities through cultural and linguistic knowledge and skills.

IB schools are committed to multilingualism as a means of affirming cultural identity and developing international-mindedness. The term "multilingualism" in the PYP refers to linguistic ability in more than one language, and recognizes that each of a student's languages may be developed to different levels, and within different contexts, depending on their social and academic experiences.

In addition, multilingualism has cognitive benefits relating to:

- attention and focus
- problem-solving thinking skills
- thinking about language.

(Kessler, Quinn 1980; Zelasko, Antunez 2000)

Multilingualism is the interplay among languages within a person, with their interactions with others and also with the learning community's attitudes towards languages. Becoming multilingual is a means through which we deepen our understandings of alternative perspectives and reach out to others. It takes into account the complex reality of our world's diverse sociocultural contexts.

Students who are multilingual have an improved capacity to think, talk and reflect on how languages work, which is why PYP students learn at least one additional language from the age of seven. Through learning additional languages, students become cognitively more flexible, creative and better at problem-solving. Students who see and hear their own languages within the learning environment, and who are encouraged to actively make links to their prior linguistic experiences, connect more quickly to the community and their own learning (Cummins 2000).

All members of the learning community are interested in, engaged with and inquire about languages, and see themselves as agents in the process.

The language learner

Confident communicators

PYP students learn to communicate confidently and creatively in more than one language, and with awareness of the power of language to have an impact on others. This is reflected in their language choices concerning style, tone, words, expression and gesture.

Through language, students:

- express identity
- develop international mindedness
- become literate
- become effective inquirers
- communicate.

Expressing identity

The PYP school welcomes all students and seeks to understand, affirm and promote their language and cultural backgrounds through the learning community and curriculum. All students have a unique language profile shaped by relationships and interactions within their own family, culture and the wider world. The continued development of home and family languages is crucial for cognitive growth and in nourishing cultural identity.

Student language profiles

The complex and diverse language profiles among students may mean that they are learning in a language additional to that of their home and family, or of their prior educational experience. School may be the first time that students encounter an additional language or they may already be proficient in several languages. Some students are familiar with the language of their school while, for others, the values, beliefs and behaviours around language and literacy are new.

The student language portrait

Language backgrounds, experiences and goals are some of the factors inherent in a student's language profile. These factors may be captured through the tool of a student language portrait.

The portrait may also include students' perspectives and preferences, interviews with families and examples of language competencies in home and family languages. This information informs planning, enabling teachers to tap into the knowledge and strengths of students and facilitate further language development.

Developing international-mindedness

Multilingualism is significant in building international-mindedness as it gives students insight into the thinking and perspectives of the self and others. Language enables students to gather and compare points of view, and to show empathy, compassion and respect.

Students' skills, knowledge and understandings of language play a fundamental role in the development of the attributes of the learner profile, for example, as communicators. Shared understandings of language are constructed and contribute to an ongoing exploration into what it means to be internationally minded.

Becoming literate

Literacy invites the student into new ways of making meaning and exploring the world through language. Language students make meaning from written, viewed or oral text and apply their developing understandings of symbolic cues. Multiliteracies involve students in different ways of accessing and making meaning, including digital technologies and their vast potential for expression and audience. Through literacy, students uncover perspectives in texts and learn about the power of communication. Literature is a source of pleasure as well as thoughtful provocation as students use it to explore other ways of knowing and seeing the world.

Becoming effective inquirers

Language is intrinsic to learning. It underpins the capacity to think critically and creatively, to inquire and collaborate. It is the primary means through which knowledge is accessed and processed, and through which conceptual understandings are developed; it is the means to reflect on ideas, knowledge and experiences.

Communicating

The language of school is different in many respects from the languages children learn and use at home. Students and teachers use language for specific purposes and within particular learning contexts, and these influence the language choices made. Language supports relationship-building and the negotiation of meaning. Through language, students communicate their ideas and understandings to the local and wider learning community using multiple modes of expression. Students use language to:

- question and probe
- set limits and break boundaries
- compare, explain and influence.

The language learning community

School culture is a manifestation of the relationships, beliefs and values of a learning community. It shapes the ways members act and interact, and expresses the principles and values that underpin thinking and communicating. Every PYP learning community has a unique linguistic and cultural profile that forms the basis for its language policy and curriculum. For this reason, each school develops a school language policy that makes the most of its linguistic and cultural resources to meet its individual needs.

TSM: Reviewing a language policy

Using home and family languages in school supports students who are new to the language of instruction. It engages them quickly in learning by helping them to access their prior knowledge. Parents have a vital role to play as they discuss learning at home with students, deepening understandings across and beyond the programme of inquiry. This also enables connections among languages to develop.

A learning community builds a positive culture of language learning by:

- embedding the values and beliefs that underpin multilingualism, such as being open-minded, caring communicators
- recognizing the importance of belonging and connectedness in personal and cultural identities
- recognizing the vital role families play in supporting, developing and sustaining children's language development
- creating environments where students use their home language with pride, and access host or global languages to engage with the world
- actively promoting the maintenance and development of home languages
- developing students' metalinguistic skills and understandings by facilitating and actively encouraging opportunities to make connections between languages
- ensuring that multiple languages are seen and heard throughout the school and in communication between home and school
- promoting language learning as a means to build and strengthen intercultural relationships
- reflecting on the community's effectiveness of building a positive culture of language learning through collaboration.

Becoming a multilingual learning community

Learning communities view language as part of the learning landscape and encourage students to identify the connections between languages and attributes of the learner profile. Creating a multilingual learning environment is a collaborative process involving all members. Learning communities collaborate to establish shared understandings about language, and reach agreements together through the discussion and exploration of perspectives. Students are agents of this process, exploring and establishing classroom agreements about the role and value of languages in the classroom and sharing their linguistic knowledge and skills with the learning community.

TSM: Student language agreements

Children are naturally curious about other languages. Multilingual schools intentionally provide opportunities to explore language and stimulate curiosity and open-mindedness in a spirit of inquiry. These might include seeing, hearing and sharing languages:

- spoken and sung

- displayed on different alphabet and number charts, posters, labels
- used in learning spaces, games, poetry and performances
- used in learning displays
- used within identity texts*, and bilingual texts (oral, written, digital, poetic, musical, and so on)
- chosen for the exhibition
- through technology
- in explorations of the similarities and differences between languages
- through learning experiences within a unit of inquiry
- from other members of the learning community
- within the context of action.

*(Cummins 2001)

In planning for the programme of inquiry, a learning community takes multilingual diversity into account and provides opportunities for its development within individuals, groups and the local and global learning community.

Beyond the languages of the learning community, opportunities to explore the multilingual nature of the world might include inquiries into family languages, historical or geographical languages within the local community, and the relationships among languages and cultures of the learning or local and global community.

TSM: How multilingual is my school—A self-audit tool

Language learning and teaching

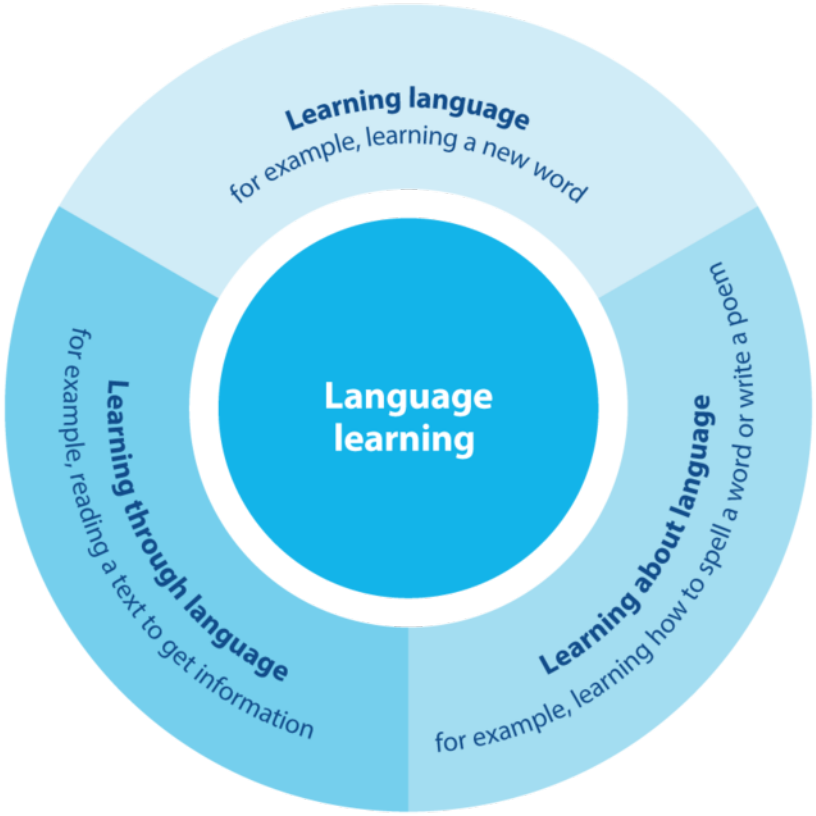
Language learning—An overview

Language provides an intellectual structure for conceptual and critical thinking within and beyond the PYP transdisciplinary framework. All teachers are language teachers as all learning takes place through language. This is particularly evident in the early years where learning and teaching has a strong focus on language development.

All students bring a significant body of language knowledge to school with them; knowledge about language and the way it works, knowledge about learning language, and knowledge of the social role of language. This includes understandings of literacy developed in the home and family language in either formal or family contexts.

Language learning and teaching immerses students in the interplay between learning language, learning through language and learning about language. Although these aspects are inseparable, they are used here to support an understanding of how language is learned and used to make meaning.

Figure LA01: Language learning



(Adapted from Halliday 1985)

Learning language

Learning takes place when new knowledge is integrated with existing knowledge and conceptual frameworks. Students' language development is best served when they have opportunities to strengthen and build these frameworks by engaging in language learning in multiple modes within authentic, meaningful contexts. In an inquiry-based classroom, teachers and students enjoy using language, appreciating its functionality and aesthetics. They have opportunities to engage with multiple languages through a variety of modes, such as literature, drama, story writing, technology and discussion. They reflect on their form and use across and within transdisciplinary and subject-specific contexts.

Students seek to make meaning from what they see and hear, and in responding to others they test out their hypotheses of language. From the responses they receive, students formulate new understandings of language and how it works. Teachers and others in the learning community that students interact with, interpret and rephrase, question and provide models in this process. This extends the knowledge, skills and understandings that students develop; inherent in this process is the absorption of values about language and learning.

Language learning is a complex developmental process. PYP *Language scope and sequence* (2009) presents a set of diagnostic tools and guidance, underpinned by conceptual understandings. This assists teachers in planning language learning experiences for students and in monitoring their language development. Schools may decide to use or adapt the *Language scope and sequence* (IBO 2009) according to their needs. Teachers facilitate effective language learning when they:

- explicitly activate prior knowledge using home and family languages, and other languages where appropriate
- use their knowledge of students' prior language skills and understandings to personalize learning engagements
- identify language learning opportunities and co-construct learning goals within and across units of inquiry, and learning engagements (for example, in a unit of inquiry around habitats, teachers and students together identify the language used to classify features; in an inquiry about health and body systems, students would have the opportunity to explore terms needed to express cause and effect)
- record and share information to map development, plan for language learning and co-construct goals
- incorporate strategies needed to activate and build background knowledge when planning units of inquiry or lessons
- reflect on language obstacles to learning and how to remove them
- scaffold learning to extend language.

Scaffolding language learning

Scaffolding supports the assimilation of new language. Scaffolds are temporary supports given as new language is acquired. Question prompts when reading, picture prompts for story sequencing, or use of the home and family language to carry out research, are all examples of scaffolding. Other examples include:

- visual and practical aids (including technology)
- teacher language and questioning
- graphic organizers
- demonstrations
- dramatizations
- small, structured collaborative groups
- breaking learning into steps
- modelling by thinking out loud
- pre-teaching vocabulary
- translanguaging strategies.

Extending language

Teachers extend students' language learning by scaffolding opportunities using collaborative practices with rich text. As students progress through school they interact with increasingly sophisticated texts. These reflect the growing complexity of academic language and concepts, such as subject-specific vocabulary and grammatical constructions. From the early years, students begin to use complex functions of language, such as classifying, justifying, hypothesizing, clarifying, explaining, comparing, and so on, at a developmentally appropriate level. By being aware of the nature of language used in school, teachers can extend students' language repertoires.

The academic language of school is complex and context-specific; it therefore takes longer to acquire than language used in a social environment. Teachers explicitly model and scaffold the use of academic language in context and co-construct language learning goals in collaboration with students and other teachers, where possible. The student language portrait helps teachers learn more about the students' language experiences and enables them to understand how students' languages might best be integrated in school contexts.

Learning additional languages

The PYP requires the acquisition of an additional language from the age of 7 to support the development of international-mindedness. This additional language might be the language of the host country or another language that is part of the curriculum or community. Bilingual and dual language schools do not need to add another language to the curriculum, but may choose to do so.

New to the language of instruction

Students come to school with a wide range of language backgrounds, and for many students this may be the first time that they encounter the language of instruction used at school. Schools have language support and structures in place to ensure inclusivity for students for whom the language of instruction is not their home and family language or the language of their prior school experience.

Students learning additional languages are simultaneously processing more than one language and this extra work for the brain is tiring. Where the student is immersed in a language environment unfamiliar to them, there is an enormous amount of cultural information to be absorbed alongside the language, including unfamiliar patterns of social interaction. The learning community is concerned with the well-being of all students and is aware of the needs of additional language learners. Schools take the time and make the effort to support and develop this awareness among all stakeholders.

Affirming identity

Key to student language development is valuing the language profiles of students. Using artifacts, people, language resources, activities and other opportunities to enrich the learning community enables students to connect personally to their learning, to promote self-efficacy and to build intercultural understanding. These environments support the development of the attributes of the learner profile.

Identity can be affirmed by:

- establishing a learning environment that welcomes and embraces diversity in languages, cultures and perspectives
- valuing and using diversity as a resource to enhance learning
- providing opportunities to sustain home and family languages
- involving the learning community in establishing understandings of how best to collaborate to achieve shared goals.

Learning through language

As communicators and collaborators, students engage with language at school in multiple contexts and multiple modes. They listen, read, speak, perform, write and view text in order to make meaning, and

explore and share new understandings and knowledge. Learning is embedded within language and is underpinned by relationships as a reciprocal meaning-making process.

Teachers scaffold language within learning in order to facilitate successful access to the resources and ideas students need in the pursuit of their inquiries. They use language to provoke thought, spark interest and promote independent, motivated learners. Teachers are aware of barriers to learning that language might create, and personalize support for students when necessary. Understanding that language is important in accessing knowledge, ideas and ways of thinking in subject areas; teachers ensure that students have the appropriate linguistic tools with which to learn.

Translanguaging

Students use language most effectively by drawing on all their prior linguistic resources, their skills and knowledge about language and language learning. They benefit from awareness of the similarities and differences between their languages in phonemic, syntactic and grammatical aspects. Translanguaging is the process by which language students actively draw on all their linguistic resources to communicate and make meaning (Garcia, Li Wei 2014). This occurs, for example, when using bilingual books or working with someone who speaks the same language. By providing opportunities for students to make connections between their languages and to draw on prior knowledge, the teacher facilitates effective learning while affirming identity (Cummins 2000).

To support agency in language learning and effectively incorporate translanguaging strategies, students discuss what language means to them personally and set language goals for themselves. A powerful means to establish a multilingual class community is for students to develop their own "student language agreements" as a group or learning community (Chumak-Horbatsch 2012).

TSM: Translanguaging

Learning about language

Language is a visual, print and oral symbolic system with its own codes and signals. Therefore, language learning also involves learning about language—its form, conventions and contextual use.

Literacy

Through early experiences of reading with adults, children learn that reading is an enjoyable, achievable and rewarding activity. They learn that text conveys meaning and perceive the print concepts, codes and conventions in the languages of their home and family and school. Drawing attention to the wide range and variety of texts around us (including stories, poems, digital media, lists, instructions and posters) supports this process.

Texts in multiple languages in the home and the learning community are opportunities to understand different perspectives and develop understandings of the multilingual nature of our world. Family literacy traditions vary widely among different cultures, and teachers show interest in learning about these in order to better support students and their families.

At school, students and parents are invited to share home and family language texts. Students hear the sounds of other languages and develop awareness of different phonemic systems by joining in with poetry and songs. Other writing systems are displayed and discussed as students are invited to share their personal literacy knowledge with others. Schools explore ways to represent students' literacy backgrounds in the learning environment and reflect on their success. These activities help build early metalinguistic skills to support the development of other languages. As students develop understandings that other people communicate in ways that are the same and different from us, they strengthen and promote international-mindedness.

Multiliteracies

As the nature of literacy has changed in our world through developments in technology, education and the workplace, so our understandings of text, literacy and literacy practices have changed. Text can exist in a

paper mode, live mode, electronic mode or a combination of these (Anstey, Bull 2006). These combined forms are called "multimodal" texts; for example, websites often have writing, pictures, cartoons or videos all operating in unison to communicate ideas. A book combining pictures and writing is also multimodal, as is a performance that combines music and movement.

The term "multiliterate" is used to describe a person who successfully engages with texts that are paper, live, electronic or multimodal—from simple signs to discussions, presentations, art, music and complex interactive digital technologies, in both receptive and productive modes. Multiliteracy recognizes the complexity of engaging with text, and the choices and decisions inherent in understanding and producing text. Electronic, live and paper texts in all modes offer new opportunities and challenges to students to engage in learning. Through text, their understandings and views of the world and the self are influenced by new information, ideas and possibilities. Students require the ability to make strategic, ethical choices and decisions as informed, internationally minded communicators. Schools ensure that resources reflect the diverse cultural backgrounds of local and global communities.

Critical literacy

Critical literacy enables students to become active and reflective members of learning communities. Students learn to identify perspectives, purpose and techniques within texts, and identify how an audience is positioned by a writer or producer of text in order to present their point of view. Across the curriculum, students develop critical literacy through classroom experiences such as questioning and comparing texts, relating text to prior knowledge, and sharing personal reactions and experiences in everyday life.

Reflection on the power of language to convey perspectives supports the development of intercultural understanding. Through text, students imagine and empathize with the lives of others and explore perspectives more deeply. They are encouraged to reflect on the connections between language and culture, and to draw on their personal linguistic repertoires (Blommaert 2010) to make and communicate meaning. Used together, the background knowledge of students and the literacy experiences of the learning community strengthen the voices of all the cultures within a school.

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