Technology guide
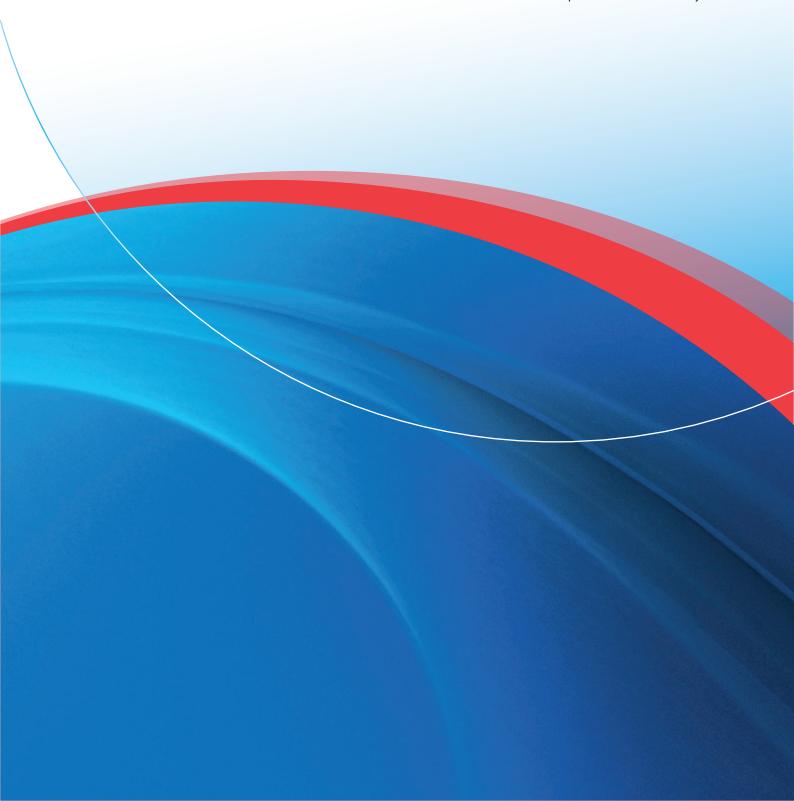
For use from September 2006 or January 2007

Technology guide

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Middle Years Programme
Technology guide

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.

IB learners strive to be:

Inquirers
They develop their natural curiosity. They acquire the skills necessary to conduct inquiry and research and show independence in learning. They actively enjoy learning and this love of learning will be sustained throughout their lives.

Knowledgeable
They explore concepts, ideas and issues that have local and global significance. In so doing, they acquire in-depth knowledge and develop understanding across a broad and balanced range of disciplines.

Thinkers
They exercise initiative in applying thinking skills critically and creatively to recognize and approach complex problems, and make reasoned, ethical decisions.

Communicators
They understand and express ideas and information confidently and creatively in more than one language and in a variety of modes of communication. They work effectively and willingly in collaboration with others.

Principled
They act with integrity and honesty, with a strong sense of fairness, justice and respect for the dignity of the individual, groups and communities. They take responsibility for their own actions and the consequences that accompany them.

Open-minded
They understand and appreciate their own cultures and personal histories, and are open to the perspectives, values and traditions of other individuals and communities. They are accustomed to seeking and evaluating a range of points of view, and are willing to grow from the experience.

Caring
They show empathy, compassion and respect towards the needs and feelings of others. They have a personal commitment to service, and act to make a positive difference to the lives of others and to the environment.

Risk-takers
They approach unfamiliar situations and uncertainty with courage and forethought, and have the independence of spirit to explore new roles, ideas and strategies. They are brave and articulate in defending their beliefs.

Balanced
They understand the importance of intellectual, physical and emotional balance to achieve personal well-being for themselves and others.

Reflective
They give thoughtful consideration to their own learning and experience. They are able to assess and understand their strengths and limitations in order to support their learning and personal development.

Contents

How to use this guide

The *Technology guide* provides the framework for teaching and learning in technology in the Middle Years Programme (MYP) and must be read and used in conjunction with the document *MYP: From principles into practice* (August 2008).

This guide was originally published in January 2006 for use from September 2006 (northern hemisphere) and January 2007 (southern hemisphere). However, the document *MYP: From principles into practice* (August 2008) now includes all general information about the programme and, as a result, the format of subject-group guides has been changed so that they include only subject-specific information.

This revised edition of the *Technology guide* includes all subject-specific information as published in the earlier version. Importantly, requirements for the subject, aims, objectives and final assessment details have not changed. However, general information about the MYP has been taken out and some additional subject-specific information included (for example, sample questions related to each of the areas of interaction).

Introduction to MYP technology

Technology and technological developments have given rise to profound changes in society, transforming how we access and process information, how we communicate with others and how we work and solve problems.

The MYP holistic approach to teaching and learning acknowledges that inquiry and problem solving contribute to students' development of thinking skills and strategies that will equip them to face the rapidly changing demands of the 21st century.

MYP technology aims to provide the means and the context to help students become skillful problem solvers, who can appreciate the role of technology in everyday life and society and who can respond critically and resourcefully to real-life challenges.

The MYP technology course intends to:

- challenge all students to apply practical and creative-thinking skills to solve problems in technology

- encourage students to explore the role of technology in both historical and contemporary contexts

- raise students' awareness of their responsibilities as world citizens when making decisions and taking action on technology issues.

This guide will give both teachers and students clear aims and objectives for MYP technology as well as details of final assessment requirements. IB-produced teacher support material to complement this guide is also available and will aid in implementing the course in schools.

Characteristics of the subject

Technology is one of the eight subject groups in the MYP with defined aims, objectives and assessment criteria. Therefore MYP technology is a subject group in its own right, on a par with any of the other subject groups of the MYP programme.

Inquiry and problem solving are at the heart of MYP technology. During the five year course, students are expected to solve problems using technology. MYP technology uses the **design cycle** as the model of thinking and the strategy to help students investigate problems and design, plan, create and evaluate the products/solutions that they generate. A **product/solution** can be defined as a model, prototype, product or system that students have generated independently. This means that MYP technology expects students to become actively involved in and to focus on the whole design process rather than on the final products/solutions.

MYP technology requires the use of the design cycle for solving problems in technology and promotes a practical and inquiry-based approach. This helps students to develop not only practical skills but also creative- and critical-thinking strategies.

MYP technology branches

Technology and technology developments are based upon the foundation of the use of information, materials and systems. MYP technology expects students to become aware of this fact through their involvement in the technology courses developed by the school. Therefore, over the five years of the programme, the MYP technology courses developed by the school should give students the opportunity to explore how the branches of information, materials and systems are used in technology and to contribute to the development of products/solutions. It is acknowledged that schools offering both computer and design technology courses will allow students to create a wider range of outcomes and therefore will provide them with a broader appreciation of the role of information, materials and systems in the products/solutions generated. However, schools offering only computer technology, for example, due to the inherent nature of this subject (where the focus and the role of materials is not as prominent as in design technology), would have to ensure that through teaching and learning strategies, students are provided with opportunities to explore and reflect on how materials are used in other forms of technology.

Information

MYP technology enables students to identify, access, evaluate and acknowledge a wide range of information sources. Information-based products/solutions use and/or communicate information to perform a task, achieve a purpose, meet a need or solve a problem.

Materials

In many cases creating a product/solution involves using materials. These may be natural or synthetic, and will differ according to geographical location, culture and available resources. Students should be able to identify, combine, experiment with, shape and handle different types of materials, and safely dispose of, or recycle, waste products. Students must select processing techniques that are appropriate to both the chosen material(s) and the product/solution to be created.

Note that in computer technology, due to the nature of the subject, the range of materials available for use may be less extensive than in design technology.

Systems

Students need to recognize the parts of a system (input, processing and control, and output) as well as the crucial role each component plays as part of the whole. Students should create systems-based products/solutions involving a group of interdependent items that interact to perform a task or achieve a purpose. These items may be materials, components or information that have been incorporated into a system in order to provide a solution to a problem.

The IB technology continuum

MYP technology builds on experiences of inquiry that students have gained in their time in the IB Primary Years Programme (PYP). PYP teaching and learning experiences challenge students to be curious, ask questions, explore and interact with the environment physically, socially and intellectually to construct meaning and refine their understanding. Even when there is no technology component in the PYP, the use of structured inquiry is a precursor to the problem-solving and inquiry-based approach of MYP technology. Students continuing onto the IB Diploma Programme (DP) will have experienced the use of the design cycle and will have developed critical-thinking and design skills, which they will be able to apply and extend in DP design technology courses.

Aims and objectives

MYP technology aspires to develop creative problem solvers who are caring and responsible individuals, able to respond critically and resourcefully to the demands of the increasingly technological society and to appreciate the importance of technology for life, society and the environment.

Aims

The aims of any MYP subject and of the personal project state in a general way what the teacher may expect to teach, and what the student may expect to experience or learn. In addition, they suggest how the student may be changed by the learning experience.

The aims of the teaching and study of technology are to encourage and enable students to:

- develop an appreciation of the significance of technology for life, society and the environment

- use knowledge, skills and techniques to create products/solutions of appropriate quality

- develop problem-solving, critical- and creative-thinking skills through the application of the design cycle

- develop respect for others' viewpoints and appreciate alternative solutions to problems

- use and apply information and communication technology (ICT) effectively as a means to access, process and communicate information, and to solve problems.

Objectives

The objectives of any MYP subject and of the personal project state the specific targets set for learning in the subject. They define what the learner will be able to do, or do better, as a result of studying the subject.

The design cycle is a model and it is intended to be the central tool to help students create and evaluate products/solutions in response to challenges. The MYP technology design cycle consists of four major stages and these relate to the objectives of the course.

Investigate

Students **identify the problem to be solved**. At the end of the course, they should be able to:

- evaluate the importance of the problem for life, society and the environment

- outline the design brief.

Students should **develop the design brief**. At the end of the course, they should be able to:

- formulate and discuss appropriate questions that guide the investigation
- identify and acknowledge a range of appropriate sources of information
- collect, analyse, select, organize and evaluate information
- evaluate the sources of information.

Students **formulate a design specification**. At the end of the course, they should be able to:

- list the specific requirements that must be met by the product/solution
- design tests to evaluate the product/solution against the design specification.

Plan

Students **design the product/solution**. At the end of the course, they should be able to:

- generate several feasible designs that meet the design specification
- evaluate the designs against the design specification
- select one design and justify its choice.

Students **plan the product/solution**. At the end of the course, they should be able to:

- construct a plan to create the product/solution that has a series of logical steps
- construct a plan to create the product/solution that makes effective use of resources and time
- evaluate the plan and justify any modifications to the design.

Create

Students **use appropriate techniques and equipment**. At the end of the course, they should be able to:

- use a range of appropriate techniques and equipment competently
- ensure a safe working environment for themselves and others.

Students **follow the plan**. At the end of the course, they should be able to:

- follow the plan to produce the product/solution
- evaluate the plan and justify any changes to the plan (when necessary).

Students **create the product/solution**. At the end of the course, they should be able to:

- create a product/solution of appropriate quality.

Evaluate

Students **evaluate the product/solution**. At the end of the course, they should be able to:

- carry out tests to evaluate the product/solution against the design specification
- evaluate the success of the product/solution in an objective manner based on testing, their own views and the views of the intended user
- evaluate the impact of the product/solution on individuals and on society
- explain how the product/solution could be improved.

Students **evaluate their use of the design cycle**. At the end of the course, they should be able to:

- evaluate their performance at each stage of the design cycle

- suggest ways in which their performance could be improved.

Attitudes in technology

This objective goes beyond technology and refers to encouraging attitudes and dispositions that will contribute to students' development as caring and responsible individuals and members of society.

This objective is set in the context of the technology class (and it is also present in MYP sciences as "Attitudes in science") but will pervade other subjects and life outside school. It includes notions of safety and responsibility when working in technology as well as respect for and collaboration with others and their shared environment.

During the course, students should:

- carry out units of work in technology using materials and techniques safely and responsibly

- work effectively as members of a team, collaborating, acknowledging and supporting the views of others

- provide evidence of personal engagement with the subject (motivation, independence, general positive attitude) when working in technology.

The design cycle

Develop the
design brief

Formulate
a design
specification

Identify the
problem

Investigate

Design
a product/
solution

Evaluate
their use of
the design
cycle

Evaluate

Plan

Evaluate
the product/
solution

Plan
a product/
solution

Create

Use appropriate
techniques and
equipment

Create
the product/
solution

Follow
the plan

Requirements

MYP technology is a compulsory component of the MYP in **every** year of the programme.

Organizing technology in the school

All MYP subjects including technology provide a curricular framework with set final aims and objectives. Schools are responsible for developing and structuring technology courses that provide opportunities for students to meet the final aims and objectives effectively by the end of the five year programme. The circumstances specific to an individual school will determine the organization of technology within the school and the variety of technology courses a school is able to offer. Whether schools are offering a range of technology courses across the five years of the programme or one single technology course, teachers need to consider the whole teaching and learning experience of their students as they move through the programme, with a view to providing students with the learning experiences that will prepare them to meet the final objectives of technology.

Schools may wish their students to receive IB-validated grades in the final year of the programme. This is a process that is organized by the MYP coordinator for the school, following the instructions in the *MYP coordinator's handbook*, section G. If a school is offering a technology course that is not included in this guide, the MYP coordinator should contact the IB at myp@ibo.org for advice. In all cases the MYP technology requirements will apply.

Teaching hours

It is essential that schools allow teachers the number of teaching hours necessary to meet the requirements of the technology course in their particular school. Teaching hours are considered the face-to-face teaching and learning hours that are scheduled in the school timetable for any given subject.

Although the prescribed minimum teaching time in any given year for each subject group is 50 teaching hours, the IB recognizes that, in practice, more than 50 teaching hours per year will be necessary to meet not only the programme requirements over the five years, but also to allow for the sustained, concurrent teaching of disciplines that enables interdisciplinary study.

In addition, schools must ensure that students are given sufficient time and tuition to allow them the opportunity to meet the final aims and objectives of MYP technology.

Resources

MYP technology encourages the use of practical work to develop problem-solving and technology-specific skills. The circumstances specific to individual schools will determine the number and kind of resources available for the development of technology courses. However, whatever the course(s) developed, schools are responsible for ensuring the conditions for a safe working environment.

Technology facilities and workspace areas should be well equipped and well maintained. Risk assessment of potential health hazards should be carried out. Good teaching and learning practice should be encouraged when dealing with equipment, information, materials and systems. Class size and supervision of practical work should be considered to minimize risk and hazards.

In addition, the online curriculum centre (OCC) is a valuable resource for teachers in the MYP. It contains discussion forums and resource banks, as well as official IB publications that can be downloaded. Please see your MYP coordinator for a school code and password.

Technology courses

Schools have a range of options to structure their technology curriculum. Throughout the five year programme schools are allowed to implement and offer any of the following technology course options or a combination of these options.

1.   A single technology course (for example, computer technology, design technology, food technology)

2.   Computer technology **and** design technology

3.   Combined technology

4.   MYP technology taught within other subjects of the curriculum

The definitions of these options follow.

Computer technology: A technology course that uses the design cycle to solve problems through the use of a computer system. Computer technology enables students to create computer-generated products/solutions to perform a task or meet a need. This course should not be confused with the use of computers and computer applications common to all subjects as an approaches to learning (ATL) skill to assist and enhance learning.

Design technology: A technology course that uses the design cycle to solve problems through the use of tools, materials and systems. Design technology enables students to use a variety of materials in the creation of products/solutions to perform a task or meet a need.

> Note: Technology courses based on materials and techniques associated with food, textiles, electronics, resistant materials, and so on, are considered design technology courses.

Combined technology: A technology course that uses the design cycle and combines knowledge, skills and techniques of both computer and design technology in the generation of products/solutions to perform a task or meet a need.

MYP technology taught within other subjects of the curriculum: A course taught within a subject other than technology that uses the technology aims, objectives, assessment criteria and design cycle to develop technological products/solutions to perform a task or meet a need.

All MYP technology courses should ensure that students:

•   have the opportunity to explore the three branches of technology: information, materials and systems

•   use the design cycle for generating ideas and creating products/solutions

•   work towards meeting the final aims and objectives of MYP technology

- are assessed against the published technology assessment criteria for final assessment in year 5

- use MYP technology interim objectives and develop modified versions of the assessment criteria in years 1–4 (see *MYP: From principles into practice*, August 2008, for more information).

Important note

- Schools in which **MYP technology is taught within other subjects of the curriculum** should ensure that they meet the conditions for "Integration across subject groups" as stated in the *MYP coordinator's handbook*, section D. Care must be taken to ensure that:

- the minimum requirement of 50 hours per year for technology is respected

- the objectives of MYP technology are clear to all concerned, addressed explicitly and assessed using the technology assessment criteria

- teachers participating in the integration of technology with other subject groups are conversant with the technology guide, and reporting of student progress in all subjects is clear to students and parents

- teachers taking part in the integration of subjects have received approved IB training in MYP technology

- some non-teaching time is available to ensure effective integration of subjects.

Developing the curriculum

Introduction

MYP technology provides a curricular framework of aims and objectives that students are expected to meet by the end of the five year programme. It is the responsibility of schools and teachers to develop the technology curriculum and to design suitable technology courses that will allow students to reach the final objectives by the end of the programme.

Teachers are expected to map the teaching and learning experiences that students will encounter as they move from one year to the next in the programme. The MYP technology courses should be carefully sequenced and articulated so that they contribute to the development of students' conceptual understanding, practical and intellectual skills as well as personal beliefs and values.

The MYP requires schools to facilitate and promote collaborative planning for the purpose of curriculum planning, review and reflection.

The staff responsible for teaching and learning in technology will need to determine the subject content for each year of the programme. All objectives must be developed in each year of the programme, at the appropriate level. In planning the technology curriculum, teachers will need to deconstruct the objectives so that they build during years 1–4 towards the highest level in the final year of the programme, providing for continuity and progression in each objective. The objectives in this guide, and the examples of interim objectives for technology available on the OCC, will guide teachers in making decisions about the choice of content and learning experiences offered to students, including the types of assessment that are appropriate for the students' particular stage of development.

In developing the curriculum for the different years of the programme, teachers are encouraged to plan increasingly complex units of work that will cover the entire scope of the objectives themselves. However, within these, discrete tasks or smaller units of work might concentrate on specific objectives.

In the final year of the programme, the curriculum should provide students with the **opportunity** to achieve the highest descriptor levels in the final assessment criteria (see the "Technology assessment criteria" section).

The following table shows how the teaching and learning experiences and the students' expected outcomes in technology should change from the earlier years of the MYP to the final two years of the programme.

MYP earlier years	to	MYP final years
simple units of work	to	complex units of work
skills development	to	skills applied to design situations
limited range of outcomes	to	open-ended challenges
guided project content	to	student-managed projects
short projects	to	long projects
students designing for themselves	to	students designing for others
emphasis placed on individual parts of the design cycle	to	all stages of the design cycle fully addressed
contrived challenges	to	real-life challenges

When planning a unit of work in MYP technology, teachers must ensure that:

- at least one area of interaction provides the context for learning

- conceptual understanding and specific technology skills are being developed

- learning outcomes match the MYP objectives (see objectives in the "Aims and objectives" section)

- the problem or need is framed as a problem-solving situation described within a realistic context, preferably a real-life one, or is a real need that can be solved through technology

- the design cycle is used throughout the unit of work

- the design folder is used to document evidence of all stages of the design cycle

- local and/or global issues are used to promote discussion about the effect of technology on society and the environment

- appropriate materials and resources are selected from a wide range of sources

- health and safety issues are addressed and provide a framework for informed decision-making

- differentiated teaching and learning methods are planned and used

- students are given clear information about how their work will be assessed, including which objectives are being developed

- interdisciplinary teaching is explored and used where appropriate

- in the final year of the programme, student achievement of the objectives is measured against the published assessment criteria (see the "Technology assessment criteria" section).

The document *MYP: From principles into practice* (August 2008) provides detailed information on organizing the written, assessed and taught curriculum, including the use of interim objectives, modified assessment criteria for years 1–4 of the programme and the planning of units of work.

Horizontal articulation and interdisciplinary approaches

Horizontal articulation, which occurs when teachers of the same year group work together to plan the curriculum, can help students to identify the connections between subjects and reflect on how the knowledge, concepts and skills developed in one subject can be transferred to others. In this sense, the use of the design cycle, and the problem-solving approach of MYP technology, can contribute to the development and reinforcement of thinking skills and learning processes that can be used across different subject groups.

Teachers of other subjects are encouraged to use the design cycle approach or elements of it for teaching and learning in their subjects. However**, interdisciplinary units of work** that involve technology must include the technology teacher and other subject teacher(s) working together in the development of the unit of work. The unit should aim to address the objectives of all the subjects involved, and the resulting student work should be assessed against each subject-specific assessment criteria. The final product/solution should meet the requirements of a technological product/solution.

Group work

In many circumstances students will want to, or need to, work in groups for their technology units of work. However, it is important to ensure that every member of the group benefits from the dynamics of the social interaction and the group-work learning experience. In the case of group work, teachers should be able to identify each student's role and responsibilities to ensure that he or she makes a contribution, and to assess each student's learning at each stage of the design cycle.

Effective use of information and communication technology

Information and communication technology (ICT) involves the use of computers, its applications and communications facilities in teaching and learning activities. Therefore the use of ICT goes beyond MYP technology and extends to all the teaching and learning in all subjects across the curriculum. The effective use of ICT is an **approaches to learning (ATL) skill** and, as such, schools must ensure that a whole-school approach is in place to allow students to develop information technology literacy and become competent users of computers.

The IB acknowledges that in most cases the technology teachers are the ones responsible for providing students with the teaching and learning experiences to help them develop ICT literacy. However, the teaching of ICT skills should not be confused with or take the place of a computer technology course.

Addressing the areas of interaction

The areas of interaction provide contexts through which teachers and students consider teaching and learning, approach the disciplines, and establish connections across disciplines. They are organizing elements that strengthen and extend student awareness and understanding through meaningful exploration of real-life issues. All teachers share the responsibility of using the areas of interaction as a focus for their units of work.

The process of inquiring into the subject content through the different perspectives or contexts of the areas of interaction enables students to develop a deeper understanding of the subject as well as the dimensions of the areas of interaction. Through this inquiry cycle of understanding and awareness, reflection and action, students engage in reflection and metacognition, which can lead them from academic knowledge to thoughtful action, helping to develop positive attitudes and a sense of personal and social responsibility.

The document *MYP: From principles into practice* (August 2008), section "The areas of interaction", provides further information relating to the dimensions of each area of interaction, the inquiry cycle, planning units of work, and focusing relevant content through these areas of interaction.

There are five areas of interaction:

- approaches to learning (ATL)

- community and service

- health and social education

- environments

- human ingenuity (formerly *homo faber*).

The following sections on the areas of interaction provide sample questions that might be used as **MYP unit questions** or **inquiry cycle questions**, depending on the content being taught. These particular questions are "content free", and when devising their own questions, teachers can relate them to the specific content that is being explored in a unit of work.

It is important to note that the areas of interaction are ways of looking at content: some of the examples that follow could easily fit into more than one area of interaction perspective, and also have the potential to be explored through subjects other than technology.

The contexts that frame the content curriculum in technology must be natural and meaningful. Often when designing a unit of work, the context for the content will emerge naturally as a real problem or need to be addressed through the use of technology. To provide meaningful learning experiences, teachers should ensure that the MYP unit question gives students scope for inquiry into the issues and themes within the content. The area of interaction will then give direction to teacher-directed and student-initiated inquiry.

Please note that any reference to "I" in the areas of interaction questions could also be interpreted as "we" where this is more appropriate to the social ethos of the school or location.

Approaches to learning

How do I learn best?
How do I know?
How do I communicate my understanding?

Approaches to learning (ATL) are central to all MYP subject groups and the personal project. Through ATL, schools provide students with the tools to enable them to take responsibility for their own learning. This involves articulating, organizing and teaching the skills, attitudes and practices that students require to become successful learners.

The MYP has identified seven groups of skills that encompass ATL: organization, collaboration, communication, information literacy, reflection, thinking and transfer. The school community will need to spend time defining the ATL attitudes, skills and practices that they consider important within these groups, for both individual subject groups and across subject groups.

The MYP technology problem-solving approach to teaching and learning naturally contributes to the development of students' problem-solving and thinking skills. The design cycle provides students with a framework that organizes the way in which they learn and address issues.

Sample questions

- What do we learn in technology? How is learning in technology similar to or different from learning in other subjects?

- What skills are specific to technology?

- In what ways can the use of the design cycle help me learn?

- How do we investigate an issue in technology?

- How do we acknowledge sources?

- How do we formulate a design specification?

- How can I communicate my design ideas?

- What is an effective plan in technology?

- How can we effectively record the process of creation?

- Of what does an evaluation in technology consist?

    – How do I evaluate my work?

    – What is the value of evaluating the work of others?

- What is the value of reflection in technology?

    – What does it mean to be competent in technology?

- How can I improve my learning and my performance in technology?

    – How can I organize my learning in technology?

    – What will I do differently in the next unit of work?

    – What will I do to improve a specific skill?

- How does learning technology help me with learning in other subjects?

- What skills and knowledge can I take from other subjects and use in my technology learning?

- What is the relationship between information and communication technology (ICT) and technology? How can ICT help my learning in technology?

Community and service

How do we live in relation to each other?
How can I contribute to the community?
How can I help others?

The emphasis of community and service is on developing community awareness and a sense of belonging and responsibility towards the community so that students become engaged and feel empowered to act in response to the needs of others.

Community and service starts in the classroom and extends beyond it, requiring students to discover the social reality of self, others and communities. This, in turn, may initiate involvement and service in the communities in which they live. Reflection on the needs of others and the development of students' ability to participate in and respond to these needs both contribute to the development of caring and responsible learners.

Students will explore the nature of past and present communities through technology, as well as their place in their own communities. Incorporating community and service into the study of technology encourages responsible citizenship as students deepen their knowledge and understanding of the world around them.

The MYP technology course should help students to reflect on the role of technology in society and the impact of technology and technological developments in local and global settings. Often by considering local technology-based issues students can pursue community and service activities for themselves, and find ways in which a technology product/solution can be applied to meet a social need or solve a community problem.

Activities that may be considered to integrate community and service through technology include:

• identifying local community needs and developing a technology product/solution to meet these needs

• analysing the impact of a named technology or technological application on the community or on society

• reflecting on the role of technology in shaping life and society.

Sample questions
• What is the role of technology in a community and in the world?

• How does technology shape communities and our lives?

• How does technology communicate across time and cultures?

• How can I learn about communities through technology?

• What are the powers and limitations of technology in my community and in the world?

• To what extent do people and/or communities change through technology experiences?

• How can technology influence a community? How can communities influence technology?

• What is my role in the community? How can I contribute to my community through technology?

• What would the world be like without technology?

Health and social education

How do I think and act?
How am I changing?
How can I look after myself and others?

This area of interaction is about how humanity is affected by a range of social issues (including health). It includes an appreciation of these effects in various cultural settings and at different times. It is concerned with physical, social and emotional health and intelligence—key aspects of development leading to a complete and balanced lifestyle.

Health and social education goes beyond the sole provision of information and acquisition of knowledge, and encourages the development of critical-thinking skills and attitudes that play an important role when making decisions and confronting life options. Health and social education encourages respect for the self as well as respect for others. This enables students to understand how personal decisions and actions can affect themselves as well as others.

Activities that may be considered to integrate health and social education through technology include:

• development of health and social awareness campaigns within the school and local community using products/solutions developed in technology

• evaluation of the impact of technology and technological applications on health, quality of life, and social well-being

- raising awareness that health risks and hazards can be reduced through careful design of products/solutions

- raising awareness of social, cultural and economic factors associated with technological developments.

Sample questions

- How does technology affect society, individuals, me?

- Can technology be used to influence people and societies?

- To what extent do people change through technology experiences?

- To what extent can technology contribute to the well-being of people and societies?

- Can technology communicate the health of a society and/or nation?

- Is technology a luxury or a necessity in societies?

- In what way does technology allow me to express myself?

- Can I create a product/solution to communicate with others?

- How can learning technology facilitate my understanding of myself and others?

- How important is technology for personal and social development?

- How can my learning of technology help me make healthier choices?

- What behaviours and attitudes will I seek to change in myself?

Environments

What are our environments?
What resources do we have or need?
What are my responsibilities?

This area of interaction considers environments to mean the totality of conditions surrounding us, natural and human-made. It focuses on the wider place of human beings in the world and how we create and affect our environments. It encourages students to question, to develop positive and responsible attitudes, and to gain the motivation, skills and commitment to contribute to their environments.

Activities that may be considered to integrate environments through technology include:

- analysis of the impact of technology and/or technological products/solutions on natural and human-made environments

- analysis of the effective use of resources, materials and energy in the development of technological products/solutions

- analysis and evaluation of how technology and technological applications can change the dynamics of natural and human-made environments.

Sample questions

- How can technology influence natural and human-made environments?

- In what way can environments influence technology?

- What issues do natural and human-made environments present for technology?

- In what way do environments affect people that develop technology?

- How can technology enable me to understand and contribute to different environments?

- How can technology impact on the school environment?

- What realistic changes can I make that will impact positively on my environments?

- What are the powers and limitations of technology in addressing issues of natural and human-made environments?

Human ingenuity (formerly *homo faber*)

Why and how do we create?
What are the consequences?

Human ingenuity looks at human contributions in the world both in their particular context and as part of a continuing process. It stresses the way humans can initiate change, whether for good or bad, and examines the consequences. This area also emphasizes both the importance of researching the developments made by people across place, time and cultures, and the importance of taking time to reflect on these developments.

The study of MYP technology provides many opportunities to incorporate human ingenuity into the curriculum. Human ingenuity goes beyond the sole creation of the product/solution. It leads students to examine experience and reflect on the creative process. Students are expected to reflect on the origin, process, context, development and impact of the product/solution on individuals, societies and the world. Technological developments and innovations can be assessed from a social, economic, political, environmental, cultural and ethical perspective.

Activities that may be considered to integrate human ingenuity through technology include:

- analysis of specific products/solutions and processes derived from technology and how they have changed the world

- evaluation of social and ethical factors associated with technology and technological developments

- appreciation of the responsibility of designers, and of those who develop new technologies, for the uses and consequences of their products and designs.

Sample questions
- What is technology? Where does technology come from?

- How has technology evolved over time?

- How can technology initiate change?

- In what ways have humans shaped technology? In what ways has technology shaped our lives?

- What are the effects of technology evolution?

- What would the world be like without technology?

- In what way has knowledge influenced technology?

- In what way has technology influenced knowledge?

- To what extent are sciences and technology interrelated?

- How is technology developing in my time and culture?

- How do different technologies impact each other?

- On what basis do I choose the technology I use in different contexts?

- What contributions to development has technology made?

- Who are the technology pioneers in my time? What makes them pioneers?

- To what extent do people change through technology experiences?

- Can technology be unethical?

- How have my own views of technology changed?

Technology-specific guidance

How to use the guidance sections

The specific content of an MYP technology course will differ according to the local or national conditions in which an individual school is working. However, all technology courses should allow students to:

- meet the aims and objectives of MYP technology by the end of the programme

- use the design cycle to develop intellectual and practical approaches to problem solving

- generate technological products/solutions of appropriate sophistication

- become aware of the role that information, materials and systems play in technology.

The information in this section is not prescriptive and is not intended to limit teachers in the development of their technology courses. The guidance section is intended to support teachers' implementation of MYP technology courses and provide them with ideas and suggestions for developing suitable courses in technology. The "General guidance" section is common to all technology courses while the subject-specific guidance sections refer to computer technology and design technology.

For further guidance on curriculum planning in the MYP, teachers should refer to the accompanying document to this guide, *MYP: From principles into practice* (August 2008).

General guidance

Time allocation

Schools offering the prescribed minimum teaching time of 50 hours per year for technology should be aware that in order to complete two to three projects/solutions in the final year, the time allocated for each project should be approximately 15–20 hours. This time allocation should allow students the time to create products/solutions that are sufficiently sophisticated and complex. As an approximate guide, 20% of this allocated time should be devoted to the creation stage of the design cycle. The remaining 80% of this time should be devoted to the other stages of the design cycle. Such a division of time should provide students with the necessary time to work towards achieving the highest achievement levels in all criteria, and not to use all of the available time on creating their product/solution.

Products/solutions

In MYP technology the creation of products/solutions aims to solve a problem or address a specific need. These problems or needs could be artificial situations suggested by the teacher or could be real-life situations that the student or the teacher has identified in the local surroundings. Real-life situations that are relevant to students' life and local reality pose interesting and provoking challenges to pursue.

The sophistication of the projects/solutions generated in the last two years of the programme should provide evidence that students have:

- achieved a thorough understanding of the issues addressed

- developed systematic scheduling and planning

- generated a sufficient range of feasible designs

- mastered appropriate technological skills and techniques

- produced thoughtful reflections and evaluations of the product/solution.

Design folder

The design folder is a compulsory component of MYP technology. As students progress through the different stages of the design cycle, they are constantly experimenting with ideas, researching topics, compiling sources, brainstorming issues, sketching possible solutions, making changes, rejecting proposals and critically evaluating their work. All relevant activities and outcomes should be recorded, and dated, in the design folder.

The design folder is a compilation of evidence that accompanies the final product/solution for a unit of work. Students formally record the results of their research, their various plans and designs and the evaluation of their finished products/solutions in the design folder.

The design folder must be clearly divided into: investigate, design, plan, create, evaluate. It must begin with the student's investigation and end with the evaluation.

Guidance for computer technology

Computer technology products/solutions should:

- represent authentic students' designs and creations and not be the result of template application or secondary source compilations

- provide students with the opportunity to explore, select and use information and computer systems to solve real problems

- be sophisticated enough to enable students to demonstrate the acquisition of MYP year 5 computer technology skills

- provide students with the opportunity to develop a series of intellectual and practical skills such as the ability to:

  – select the appropriate software to solve a problem

  – select a suitable output format for the problem being solved (DVD, video, print format)

  – understand and demonstrate the difference between computer hardware and computer software.

The following examples of suitable and sophisticated year 5 products/solutions that allow students to achieve the highest achievement level of the assessment criteria are provided for guidance.

1. A **website** where the student:

   – shows evidence of original creation and uses appropriate web-authoring tools

   – provides intuitive navigation

   – demonstrates consistent design (possibly through Cascading Style Sheets)

   – uses text, graphics and other media as suited to the purpose of the product/solution.

Note: A website created by online template services or exported to web pages by other applications would not be a sufficiently sophisticated product/solution for year 5 students.

2.   A **video**, **animation** or **podcast** where the student:

–   shows evidence of original creation using appropriate authoring tools

–   shows evidence of its creation through an explicit editing process

–   makes use of appropriate effects (titles, fades, credits, and so on)

–   provides a run-time version of software used unless it is part of the Microsoft® Office suite or a VCD/DVD that can be viewed by any multimedia software.

Note: A product/solution of this type would use primary source information and/or content generated by the student and would not simply be a compilation of secondary source materials.

3.   A **database** or **model** where the student:

–   shows original creation and uses appropriate tools (for example, Filemaker®, Microsoft® Access™, and so on)

–   creates a modelling solution to a problem, using a spreadsheet program (the level of complexity would usually include macros)

–   provides an intuitive user interface

–   includes the requirement of user input

–   provides a variety of outputs for results.

Note: A product/solution that is created by a proprietary modelling application would not be sufficiently sophisticated for year 5 students.

4.   An **interactive application**, a **game** or **story book** where the student:

–   shows original creation and uses appropriate authoring tools (for example, Adobe® Flash®, Microsoft® PowerPoint®, HyperStudio®, and so on)

–   provides intuitive rules and/or navigation

–   uses effects and/or programming appropriate to the task

–   provides a non-linear (or branching) interactive experience

–   provides a variety of outcomes.

Note: A product/solution of this type would use primary source information and/or content generated by the student and would not simply be a compilation of secondary source materials. A linear interactive product with only one possible output would not be sufficiently sophisticated for year 5 students.

Guidance for design technology

Design technology products/solutions should:

- represent authentic students' designs and creations and should not be the result of the assembly of commercial kits, flat packs or recipes

- provide students with the opportunity to explore, select and use different materials (wood, plastic, metals, textiles, food, and so on) as appropriate

- provide students with the opportunity to develop a series of practical skills such as:

  – cutting and marking accurately

  – measuring and estimating

  – shaping and finishing

  – using wasting and joining techniques

  – using electronic components to produce an electronic system that may include inputs, outputs and some processing between inputs and outputs.

The following examples of suitable and sophisticated year 5 products/solutions that allow students to achieve the highest achievement level of the assessment criteria are provided for guidance.

1. A **product to improve a child's motor skills** where the student:

   – demonstrates original creation and uses appropriate tools such as electric saws, drilling machines, lathes, vacuum forming machines, line bending machines, sewing machines, overlockers, and so on

   – uses feasible designs that are clearly illustrated and annotated

   – produces working drawings that illustrate the measurements and materials to be used

   – creates clear flow charts of the manufacturing steps to allow others to follow the plan and create the product/solution.

2. A **solution to recycling aluminium cans** where the student:

   – demonstrates original creation and uses appropriate tools such as electric saws, drilling machines, lathes, vacuum forming machines, line bending machines, and so on

   – uses feasible designs that are clearly illustrated and annotated

   – produces working drawings that illustrate the measurements and materials to be used

   – creates clear flow charts of the manufacturing steps to allow others to follow the plan and create the product/solution.

3. An **environmental monitoring system to water plants** where the student:

   – demonstrates original creation and uses appropriate tools, such as etching tanks and soldering guns, to create populated printed circuit boards

   – uses feasible designs that are clearly illustrated and annotated

   – uses electronic components to produce an electronic system that includes inputs, outputs and some processing

   – creates clear flow charts of the manufacturing steps to allow others to follow the plan and create the product/solution.

4.   A **healthy menu for a school canteen** where the student:

–   demonstrates initiative and creativity in the design and creation of the product/solution

–   uses feasible designs that reflect a thoughtful selection of ingredients and processing techniques and includes his or her analysis against the design specifications

–   shows careful consideration of the role and properties of ingredients such as function, nutritional value, aesthetic properties, cost, shelf life, availability, environmental and ethical issues, and so on

–   demonstrates efficiency and accuracy in the use of appropriate processing techniques and ingredients

–   shows consideration of processing, hygiene and food management techniques and safe working practices

–   shows consideration of the use of resources, water, electricity, food additives and packaging, and of waste disposal and shelf-life issues, and so on

–   creates clear flow charts of the manufacturing steps to allow others to follow the plan and create the product/solution.

Assessment in the MYP

There is no external assessment provided by the IB for the MYP and therefore no formal externally set or marked examinations. All assessment in the MYP is carried out by teachers in participating schools and relies on their professional expertise in making qualitative judgments, as they do every day in the classroom. In line with the general IB assessment philosophy, a norm-referenced approach to assessment is not appropriate to the MYP. Instead, MYP schools must follow a criterion-related approach. This means that students' work must be assessed against defined assessment criteria and not against the work of other students.

It is expected that the procedures for assessment and the MYP assessment criteria are shared with both students and parents as an aid to the learning process.

Using the assessment criteria

The assessment criteria published in this guide correspond to the objectives of this subject group. The achievement levels described have been written with year 5 final assessment in mind.

All schools **must** use the assessment criteria published in this guide for final assessment, although local or national requirements may involve other assessment models and criteria as well.

In years 1–4, schools will probably wish to adapt the expected achievement levels for each criterion according to the progression of learning organized by them. Schools may add other criteria and report on these internally to parents and students.

Clarifying published criteria in year 5

During the final year of the programme, the final assessment criteria as published in each subject-group guide must be used when awarding levels. However, specific expectations of students for a given task must still be defined.

Teachers will need to clarify the expectations of any given task with direct reference to the published assessment criteria. For example, in technology, teachers would need to clarify exactly what a "range of feasible designs" means in the context of a given assessment task. This might be in the form of:

- a task-specific clarification of the criteria, using the published criteria but with some wording changed to match the task
- an oral discussion of the expectations
- a task sheet that explains the expectations.

It is important that teachers specify the expected outcomes at the beginning of each task so that students are aware of what is required. When clarifying expectations, teachers must ensure that they do not alter the standard expected in the published criteria, nor introduce new strands. When awarding levels in year 5, teachers should always use the published criteria.

Please also see the "Technology: Moderation" section for guidance on what is required as part of background information.

The "best-fit" approach

The descriptors for each criterion are hierarchical. When assessing a student's work, teachers should read the descriptors (starting with level 0) until they reach a descriptor that describes an achievement level that the work being assessed has **not** attained. The work is therefore best described by the preceding descriptor.

Where it is not clearly evident which level descriptor should apply, teachers must use their judgment to select the descriptor that best matches the student's work overall. The "best-fit" approach allows teachers to select the achievement level that best describes the piece of work being assessed.

If the work is a strong example of achievement in a band, the teacher should give it the higher achievement level in the band. If the work is a weak example of achievement in that band, the teacher should give it the lower achievement level in the band.

Further guidance

Only whole numbers should be recorded; partial levels, fractions and decimals are not acceptable.

The levels attributed to the descriptors must not be considered as marks or percentages, nor should it be assumed that there are arithmetical relationships between descriptors. For example, a level 4 performance is not necessarily twice as good as a level 2 performance.

Teachers should not think in terms of a pass or fail boundary for each criterion, or make comparisons with, or conversions to, the IB 1–7 grade scale, but should concentrate on identifying the appropriate descriptor for each assessment criterion.

The highest descriptors do not imply faultless performance, but should be achievable by students aged 16. Teachers should therefore not hesitate to use the highest and lowest levels if they are appropriate descriptors for the work being assessed.

A student who attains a high achievement level for one criterion will not necessarily reach high achievement levels for the other criteria. Similarly, a student who attains a low achievement level for one criterion will not necessarily attain low achievement levels for the other criteria.

Teachers should not assume that the results of a group of students being assessed will follow any particular distribution plan.

Further information on MYP assessment can be found in the document *MYP: From principles into practice* (August 2008) in the section "Assessment".

Technology assessment criteria

Please note that the assessment criteria in this guide are for first use in **final assessment** from 2007.

All final assessment in the final year of the MYP must be based on the following criteria even if schools are not registering students for IB-validated grades and certification.

Criterion A	Investigate	Maximum 6
Criterion B	Design	Maximum 6
Criterion C	Plan	Maximum 6
Criterion D	Create	Maximum 6
Criterion E	Evaluate	Maximum 6
Criterion F	Attitudes in technology	Maximum 6

For each assessment criterion, a number of band descriptors are defined. These describe a range of achievement levels with the lowest represented as 0.

The criteria are equally weighted.

The descriptors concentrate on positive achievement, although failure to achieve may be included in the description for the lower levels.

Detailed descriptions of the assessment criteria and band descriptors follow.

Criterion A: Investigate

Maximum: 6

Investigation is an essential stage in the design cycle. Students are expected to identify the problem, develop a design brief and formulate a design specification. Students are expected to acknowledge the sources of information and document these appropriately.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **states** the problem. The student investigates the problem, **collecting** information from sources. The student lists some specifications.
3–4	The student **describes** the problem, **mentioning** its relevance. The student investigates the problem, **selecting and analysing** information from **some acknowledged** sources. The student **describes** a test to **evaluate** the product/solution against the design specification.
5–6	The student **explains** the problem, **discussing** its relevance. The student critically investigates the problem, **evaluating** information from a **broad range** of **appropriate, acknowledged** sources. The student describes **detailed** methods for appropriate testing to **evaluate** the product/solution against the design specification.

Notes

- **Design brief:** The student's response to the challenge, showing how they intend to solve the problem they have been presented with. This will guide their investigation as they work to develop a more detailed design specification.

- **Design specification:** A detailed description of the conditions, requirements and restrictions with which a design must comply. This is a precise and accurate list of facts such as conditions, dimensions, materials, process and methods that are important for the designer and for the user. All appropriate solutions will need to comply with the design specification.

Criterion B: Design

Maximum: 6

Students are expected to generate several feasible designs that meet the design specification and to evaluate these against the design specification.

Students are then expected to select one design, justify their choice and evaluate this in detail against the design specification.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student generates **one** design, and makes **some attempt to justify** this against the design specification.
3–4	The student generates **a few** designs, **justifying** the choice of **one** design and fully **evaluating** this against the design specification.
5–6	The student generates a **range** of **feasible** designs, **each evaluated** against the design specification. The student justifies the chosen design and **evaluates** it fully and critically against the design specification.

Criterion C: Plan

Maximum: 6

Students are expected to construct a plan to create their chosen product/solution that has a series of logical steps, and that makes effective use of resources and time.

Students are expected to evaluate the plan and justify any modifications to the design.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student produces a plan that contains **some details** of the steps and/or the resources required.
3–4	The student produces a plan that contains a number of **logical** steps that include resources and time. The student makes some attempt to evaluate the plan.
5–6	The student produces a plan that contains a **number** of **detailed, logical** steps that describe the use of resources and time. The student critically evaluates the plan and justifies any modifications to the design.

Criterion D: Create

Maximum: 6

Students are expected to document, with a series of photographs or a video and a dated record, the process of making their product/solution, including when and how they use tools, materials and techniques. Students are expected to follow their plan, to evaluate the plan and to justify any changes they make to the plan while they are creating the product/solution.

Students will sometimes embark upon a very ambitious project, or they may encounter unforeseen circumstances. In some circumstances a product/solution that is incomplete or does not function fully can still achieve one of the levels awarded for this criterion.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student considers the plan and creates at least **part** of a product/solution.
3–4	The student **uses** appropriate techniques and equipment. The student follows the plan and **mentions** any modifications made, resulting in a product/solution of **good** quality.
5–6	The student **competently uses** appropriate techniques and equipment. The student follows the plan and **justifies** any modifications made, resulting in a product/solution of **appropriate** quality using the resources available.

Notes

- **Appropriate quality:** This is the best product/solution that the student can produce, taking into account the resources available, the skills and techniques they have used, their educational development, how the product/solution addresses the identified need, and aspects of safety and ergonomics.

Criterion E: Evaluate

Maximum: 6

Students are expected to evaluate the product/solution against the design specification in an objective manner based on testing, and to evaluate its impact on life, society and/or the environment. They are expected to explain how the product/solution could be improved as a result of these evaluations.

Students are expected to evaluate their own performance at each stage of the design cycle and to suggest ways in which their performance could be improved.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student evaluates the product/solution **or** his or her own performance. The student makes some **attempt to test** the product/solution.
3–4	The student evaluates the product/solution **and** his or her own performance and suggests ways in which these could be improved. The student **tests** the product/solution to evaluate it against the design specification.
5–6	The student evaluates the success of the product/solution in an objective manner based on the **results of testing**, and the **views of the intended users**. The student provides an evaluation of his or her own performance **at each stage of the design cycle** and suggests improvements. The student provides an appropriate evaluation of the **impact** of the product/solution on life, society and/or the environment.

Notes

- **Product testing:** A stage in the design process where versions of products (for example, prototypes) are tested against the need, applied to the context and presented to the end-user or target audience.

Criterion F: Attitudes in technology

Maximum: 6

This criterion refers to students' attitudes when working in technology. It focuses on an overall assessment of two aspects:

• personal engagement (motivation, independence, general positive attitude)

• attitudes towards safety, cooperation and respect for others.

By their very nature these qualities are difficult to quantify and assess, and assessment should therefore take into account the context in which the unit of work was undertaken.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors given below.
1–2	The student **occasionally** displays a satisfactory standard in **one** of the aspects listed above.
3–4	The student **frequently** displays a satisfactory standard in **both** of the aspects listed above.
5–6	The student **consistently** displays a satisfactory standard in **both** of the aspects listed above.

Determining the final grade

This section explains the process by which a student's overall achievement level (in terms of the assessment criteria) is converted to a single grade.

1. Collecting the information

Teachers should choose units of work that provide open-ended challenges and enable assessment of students in all stages of the design cycle within a single unit of work.

For the purposes of final assessment, teachers **must** ensure that, for each student, they make **several judgments against each criterion**. This can be achieved by assessing at least two completed units of work and/or extended projects over the last two years of the programme. Technology has **six** criteria and so **at least twelve** judgments (two per criterion) must be made for each student in the final year for the purposes of final assessment.

Important: If more than one teacher is involved in one subject for a single-year group, the school must ensure **internal standardization** is used to provide a common system for the application of the assessment criteria to each student. In joint assessment, internal standardization is best achieved by:

- the use of common units of work

- shared assessment between the teachers

- regular contact between the teachers.

In certain schools, students may be grouped according to ability within the same subject. In such cases, the teachers' final assessment of student performance across all groups must be based on a **consistent application of the assessment criteria to all students**. A different standard should not be applied to different groups.

2. Making a final judgment for each criterion

When the judgments on the various units of work have been made, teachers will be in a position to establish a final profile of achievement for each student by determining the **single most appropriate level for each criterion**. Where the judgments for a criterion differ for specific units of work, the teacher must decide which level best represents the student's final standard of achievement.

Important: Teachers should not average the levels gained in year 5 for any given criterion. Students can develop academically right up to the end of the programme and teachers must make a professional judgment (that is also supported by work completed) as to which level best corresponds to a student's general level of performance for each of the criteria towards the end of the programme.

3. Determining the final criterion levels total

The final levels for each criterion must then be added together to give a **final criterion levels total** for technology for each student. As students have the opportunity to gain a maximum level of 6 for each criterion, the maximum final criterion levels total for technology will be 36. (This is the total that will be submitted to the IB via IBIS (IB information system) for those schools that have registered students to receive IB-validated grades.

4. Determining the final grade for technology

Grade boundaries must be applied to the criterion levels totals to decide the final grade for each student.

Please see the *MYP coordinator's handbook* for the table of grade boundaries for technology.

All MYP subjects receive final grades in the range from 1 (lowest) to 7 (highest) on the IB record of achievement, where students have been registered for IB-validated grades. The general MYP grade descriptors describe the achievement required for the award of the subject grade. After using the conversion table to determine a student's final technology grade, teachers should check the general grade descriptor table to ensure that the description equally reflects the student's achievement.

Schools requiring **IB-validated grades** are required to use **only** the published MYP subject-specific criteria, level descriptors and grade boundaries as a basis for the final results that they submit to the IB (both for moderation and as final assessment for certification).

Other schools (those not requiring IB-validated grades) will use the published criteria together with any additional criteria that they have developed independently, and report internally to students and parents. These schools may decide on their own grade boundaries (if using published and additional criteria), or use the boundaries published by the IB.

Technology: Moderation

The following details apply **only** to schools that request **IB-validated grades**.

Purpose of moderation

The external moderation procedure in all MYP subjects and the personal project exists to ensure that students from different schools and different countries receive comparable grades for comparable work, and that the same standards apply from year to year.

All MYP assessment is carried out by the students' own teachers (or by the supervisors in the case of the personal project). The IB moderation procedures ensure that the final judgments made by these teachers all conform to an agreed scale of measurement on common criteria.

To ensure this comparability and conformity, moderation samples submitted to the IB **must** be assessed using the assessment criteria and achievement levels listed in this guide.

The submission date for moderation samples is likely to come some time before the end of a school's academic year. Tasks submitted for moderation are not absolutely final tasks. Schools must continue to make further assessments of students' work after moderation samples have been submitted, as these later tasks will also contribute towards the student's final criterion levels total.

For general information on moderation, please see *MYP: From principles into practice* (August 2008), section "Moderation".

Teachers should note that there are three distinct phases to the moderation process.

- Phase 1: Submission of moderation samples

- Phase 2: Submission of criterion levels totals

- Phase 3: Award of MYP grades

Phase 1: Submission of moderation samples

Schools that request IB-validated grades for their students must register these students following the guidelines in the *MYP coordinator's handbook*. This includes students who are only eligible for the record of achievement along with those who are also eligible for the MYP certificate.

Each moderation sample must include **eight folders of students' work** with each folder representing the work of a single student. Only the work of students registered for IB-validated grades should be submitted. If there are fewer than eight students registered, the sample will therefore have fewer than eight folders. In

each folder teachers must include a completed coversheet *Form F3.1.* An additional folder (the background information folder) containing descriptions of the assessment tasks and background information for each task must be supplied.

> Since June 2006, schools that have had minimal adjustments to their results over a three-year period have been instructed to send only four folders of student work instead of eight in the relevant subjects. "Minimal adjustments" means differences between teachers' and moderators' totals of within plus or minus 3. This does not mean that there will be no changes to final grades, as some students' totals will still cross grade boundaries even though the differences, and therefore the moderation factors applied, are small. Schools are advised via the moderation reports whether they can send four folders the following year. The situation is monitored annually and applies only to the subjects that have been identified in the moderation reports. For further information, please see your MYP coordinator.

Prescribed minimum

To meet the required number of judgments (**two**) against each criterion, the following **must** be submitted in each folder.

> **Two completed units of work**
> Each of which:
>
> - includes all the stages of the design cycle
>
> - is organized in a design folder made up of five sections, one for each assessment criterion A–E (investigate, design, plan, create, evaluate)
>
> - includes the product itself, or a visual representation (photographs or videos) if the product cannot be sent
>
> - includes information about the student's attitudes in technology throughout the unit of work (criterion F).

Students are expected to document the process of making their product/solution (with a series of photographs or a video and a dated record) including when and how they use tools, materials and techniques. For advice on the preferred format for the submission of electronic files, please refer to the *MYP coordinator's handbook*.

The same units of work for all students in the sample should be included wherever possible. Units of work should be submitted in English, French, Spanish or Chinese.

Important notes

- Units of work for final assessment and moderation must be devised to give students the opportunity to reach the highest achievement level of each criterion.

- For the purpose of moderation, teachers can begin selecting evidence of student work and performance for one unit of work during the penultimate year of the programme (year 4). This is only advisable provided the students can meet the final objectives of MYP technology.

- In the moderation sample, teachers' assessments of students' work must be based entirely on the criteria published in this guide.

- Student work submitted should reflect the types of units of work used by the teacher for final assessment.

- Teachers should ensure that two judgments are recorded for each criterion on the coversheet *Form F3.1*. The reverse of the coversheet *Form F3.1* may contain information on extenuating circumstances for individual students if it is not already contained in the background information.

- Descriptions of the units of work and background information should be compiled into a background information folder. This information does not need to be added into each of the eight student folders. The additional background information folder may be submitted in the working language of the school (English, French, Spanish or Chinese).

- Background information should document details that may be useful to the moderators such as a comprehensive description of the units of work, the conditions under which the units of work were completed, time allocation, degree of teacher support, and availability and range of resources.

- In the background information, evidence illustrating the teacher's application of the assessment criteria and how the teacher awarded the achievement levels should also be documented.

- A response to feedback from moderation or monitoring of assessment reports should be included in the background information if appropriate.

- When the product/solution itself cannot be sent, evidence of the process of creation should be submitted. This should consist of a visual representation in the form of a series of photographs, screenshots, ongoing sketches or a video.

- Although group work is encouraged in practice, it is preferable that group work is **not** submitted for moderation purposes. It is difficult for moderators to ascertain a student's actual contribution to a piece of work that was undertaken in a group situation.

- Anything in the moderation sample that differs from the stated requirements should be explained in the background information.

- In law, students retain copyright in work they create themselves, and the school probably retains copyright in the tasks created by teachers. However, when the school submits this work to the IB, students and schools are deemed to be granting the IB a non-exclusive worldwide licence to use the work. Please see the *MYP coordinator's handbook,* sections F1 and F3, for further information on how this work may be used and section F4 for the *Student claim of exclusive copyright* form if needed.

- If teachers and students use third-party material as stimuli and/or as part of their tasks, this material must be fully referenced. This will include the title of the source, the author, the publication date, the publisher and, for books only, the ISBN. Examples of third-party material include newspaper and magazine articles, cartoons, videos, movie excerpts, extracts from books, pictures (please check the acknowledgments in the original publication for the original sources), diagrams, graphs, tables, statistics, materials from websites, and so on.

The *MYP coordinator's handbook* provides the coversheet *Form F3.1* and further guidance on submitting moderation samples in each subject.

Phase 2: Submission of criterion levels totals

Phase 1 of the moderation process takes place before the end of most schools' academic year. After submitting moderation samples, teachers should continue to assess students' work until **final assessment**.

After final assessment, teachers should use the procedure described in the "Determining the final grade" to arrive at a **criterion levels total** for each student registered for certification.

The MYP coordinator will then enter each registered student's criterion levels total on **IBIS** (IB information system), and submit this to the IB.

Phase 3: Award of MYP grades

Following moderation in each subject, the IB may, where appropriate, apply a moderation factor to the criterion levels totals submitted by a school. Final grades will then be determined by applying grade boundaries to these moderated totals.

Schools will receive notification of the final grades for their students and the IB will also provide a general and a school-specific moderation report for each subject in which students were registered.

The *MYP coordinator's handbook* provides further guidelines on submitting criterion levels totals in each subject.

Technology: Monitoring of assessment

The following details apply to schools **not** requesting IB-validated grades.

Definition

Monitoring of assessment is a service available to IB World Schools offering the MYP, whereby schools can send samples of assessed student work to the IB to receive feedback from an experienced MYP assessor in the form of a report. This service is subject to a fee.

Monitoring of assessment is aimed at providing support and guidance in the implementation and development of the programme with regard to internal assessment procedures and practices. It is not linked to validation of students' grades, and therefore differs from the process of external moderation. Monitoring of assessment is currently limited to assessment conducted in the final three years of the programme.

Samples for monitoring of assessment in technology must be submitted in English, French, Spanish or Chinese, although these may be translations into one of these languages.

Details on registering for monitoring of assessment and fees, as well as the latest updated versions of the coversheets, are available in the *MYP coordinator's handbook*. Examples of completed coversheet *Form F4.4* are available in the *Technology teacher support material*.

Further information on monitoring of assessment can be found in the document *MYP: From principles into practice* (August 2008), in the section "Monitoring of assessment". Brief information follows here.

Purpose

There are three reasons why schools send in a monitoring of assessment sample:

1.   as a requirement for the school's programme evaluation visit

2.   as a pre-check before sending in samples for moderation

3.   to receive guidance on a particular subject.

Choice of tasks for monitoring of assessment

For evaluation visit and general advice

Schools can decide on the types of task they wish to submit for monitoring of assessment for the evaluation visit or for general advice. However, it is recommended that the tasks listed in the "Technology: Moderation" section are considered, as these tasks are designed to give students the possibility to use the complete design cycle for a unit of work and are suitable to be assessed using all the assessment criteria of MYP technology.

Prior to moderation

If the school is requesting monitoring of assessment in preparation for future moderation, the tasks in the following list **must** be included in the sample of assessed student work. These are the required minimum tasks listed in the "Technology: Moderation" section.

Two completed units of work
Each of which:

- includes all the stages of the design cycle

- is organized in a design folder made up of five sections, one for each assessment criterion A–E (investigate, design, plan, create, evaluate)

- includes the product itself, or a visual representation (photographs or videos) if the product cannot be sent

- includes information about the student's attitudes in technology throughout the unit of work (criterion F).

MYP technology frequently asked questions

General

How is MYP technology different from other technology courses?

MYP technology is based on an inquiry and problem-solving approach that enables students to apply knowledge, skills and techniques to solve realistic problems by creating feasible products/solutions. MYP technology uses the design cycle as the methodological approach to problem solving through the creation of products/solutions.

MYP technology is based on a framework defined by the three branches of technology: information, materials and systems. Throughout the five years of the programme students should be given the opportunity to explore how information, materials and systems are used in technology and to contribute to the development of products/solutions.

MYP technology requires students to consider the interrelated nature of the development, application, impact and implications of technology, and how these influences have a role in shaping past and future technology developments.

What are the implications of the change from two separate technology subjects (design technology and computer technology) to one subject (technology)?

Before the MYP *Technology guide* was published in 2006, all schools were expected to implement and offer both design technology **and** computer technology courses throughout the five years of the programme. Since the 2006 technology curriculum review, and in order to broaden access to all schools, it was decided that schools could offer computer technology or design technology, or continue to offer both courses or any combination of these courses that suited their local resources and possibilities.

However, regardless of the combination of courses chosen, schools **must** ensure that requirements of the subject group are met and that the aims and objectives are not compromised. (For more information about the possible courses in technology, please refer to the "Requirements" section in this guide.)

Can lack of resources impair the delivery of an MYP technology course?

In principle, no. Although certain resources are necessary to deliver MYP technology, the emphasis is on the design cycle—its process and the development of practical and intellectual skills associated with it. The specific resources required depend on the particular course of study that individual schools adopt. Physical resources demand some capital expenditure but investment in the professional development of staff is also very important. It must also be remembered that schools have the opportunity to build up resources over a period of time.

Does MYP technology allow for other technology courses such as food technology, textiles and robotics?

Yes. MYP technology courses have the design cycle at their core and are based upon the foundation of the three branches of technology: information, materials and systems. Any course that achieves this and legitimately matches the MYP technology objectives can be considered an authentic MYP technology course.

Can technology be integrated into other parts of the curriculum?

Technology is a compulsory subject group within the MYP. As such, schools have a responsibility to allocate sufficient resources and time to ensure they provide the conditions for students to meet the final aims and objectives of the subject group by the end of the five year programme.

The nature of MYP technology inevitably presents a challenge to integration due to its distinctive teaching methodology, the requirement of technology-trained staff to deliver the course as well as the time and resource requirements necessary for an optimum implementation and delivery of the course.

Due to national scheduling restrictions, a small number of schools have been allowed to teach technology through other subjects of the curriculum. This decision, far from ideal, has put considerable pressure on the staff responsible for delivering the courses and in some cases reduced students' opportunities to meet the final aims and objectives. Therefore the option of teaching technology within other subjects should be taken with caution.

Schools where MYP technology is taught within other subjects of the curriculum must ensure that they meet the conditions for "Integration across subject groups" as stated in the *MYP coordinator's handbook*, section D. Schools offering this option must also ensure that sufficient time is provided for the development of technology products/solutions and that the teacher in charge has appropriate experience and training in MYP technology. (For more information on this please refer to the "Requirements" section in this guide.)

The option of teaching technology within other subjects of the curriculum should not be confused with the transference of intellectual and practical skills developed in technology into other subjects or the development of interdisciplinary units of work.

How much time should be devoted to complete units of work in the final year of the programme?

In the final year of the programme, it should be possible for students to complete 2–3 units of work of approximately 15–20 hours that address all stages of the design cycle. Schools offering MYP technology through other subjects should ensure that an equivalent amount of time is provided for the completion of sophisticated MYP technology products/solutions and to ensure that final MYP technology aims and objectives are successfully met.

How should schools address the three branches of technology: information, materials and systems?

All courses of study must be planned so that students have the opportunity to become familiar with the roles of information, materials and systems in technology and technological developments. Depending on the resources available to schools, the technology courses implemented, and the nature of the units of work planned by teachers, the emphasis of each branch may vary significantly from one year to the next and from one school to another. However, schools should ensure that the teaching and learning experiences provided allow students to appreciate, understand and reflect on the roles that information, materials and systems play in the technology courses developed by the schools as well as other forms of technology.

What is the design cycle?

The design cycle is at the core of the subject and is the teaching and learning approach that characterizes MYP technology. All stages of the design cycle should form part of the student learning experience. In the early years of the programme, emphasis may be given to certain stages of the design cycle, but in the last two years of the programme, all the stages must be fully addressed and documented in a design folder for all the units of work developed in technology.

Assessment

I want to assess my students in a wide variety of ways without being restricted to the choice of technology units of work only. Can I include other tasks to assess my students along the course?

Yes. It is perfectly acceptable to assess students using assessment tasks other than units of work, particularly when the aim is to assess the understanding of specific concepts and/or the development of certain skills such as in the case of formative assessment.

Complete units of work allow teachers to make summative judgments of students' achievements at the end of a stage of the course. It is important to note that as students progress in the programme and reach the final two years, most of their work is based on units of work that start with a context and challenge, and assess their use of the design cycle.

What is the connection between the criterion levels and the final grade?

A criterion level only gives a partial assessment of MYP technology. For example, a level for criterion A shows the student's ability to "investigate": to produce documented evidence of his or her interpretation of the problem and the formulation of the design specification in a specific situation or when solving a specific problem. More than one unit of work will be needed to make a final judgment of the student's final achievement for a particular criterion. Teachers will use their professional judgment to establish the final profile of achievement for each student in each criterion.

To work out a student's final grade, a teacher must have taken into account levels from all of the criteria, giving a balanced final result. In summary, the final grade is an overall view of the student's achievement in the subject; the criterion levels show student achievement in components of the subject.

What is the design brief?

The design brief is the student's response to the challenge and will guide his or her investigation as he or she works towards the development of a design specification. When developing the design brief, students should be formulating and answering questions such as: "*What is the expected outcome?*" "*Who is the target user?*" "*What are the limitations?*"

In the investigation stage, what aspects of the problem should students research?

In design technology, for example, the research questions of the problem should be based on the nature and type of materials, the tools, techniques and equipment, and whether there are similar existing products. In computer technology, for example, students could investigate product and software choices, and similar existing processes.

What does "a broad range of appropriate, acknowledged sources" mean in the context of criterion A, investigate?

To achieve the highest achievement levels of criterion A, students are expected to use a wide variety of resources that could include the Internet, magazines, catalogues, surveys, questionnaires, help files, interviews with experts in the field, and so on. Students are expected to identify, discuss and evaluate key issues from the sources that are relevant to the development of the product/solution. Students must acknowledge all work that is not their own, including text, images, music, software, codes, and so on. This information should be compiled into a list of references using any recognized referencing style used in the school.

What does "detailed methods for appropriate testing" mean in the context of criterion A, investigate?

A detailed description of the testing methods used to evaluate the product/solution against the design specification is required to achieve the highest achievement levels of criterion A.

"Detailed methods" means outlining tests for each of the parameters identified in the design specification. Examples could include a comprehensive questionnaire addressing all the parameters of the design specification, physical tests addressing those parameters that can be measured quantitatively such as weight and size, and tests addressing those parameters that are not easily measured such as opinion, preferences, sensory testing, and so on.

What elements should be present in a design specification?

The design specification consists of a list of requirements, conditions and limitations, such as time and resources, which the product/solution should meet.

For example, design specifications for design technology products/solutions could include, among other requirements, the function, dimensions and materials of the product/solution and the type of techniques to be used. They could also include issues of resource use, waste management and safety.

Examples of requirements for computer technology products/solutions could include, among others, the function, type, structure and style of the product/solution as well as the type of software(s) used including, where appropriate, issues of reliability, integrity and security.

Examples of requirements for food technology products/solutions could include, among others, the nutritional value, appearance, quality of the product/solution as well as the type of ingredients, processing techniques and safety measures required for its creation.

What does "a range of feasible designs, each evaluated against the design specification" mean in the context of criterion B, design?

By the end of the design stage, students should have demonstrated that they have a clear vision of the product/solution to be created in terms of its structure, function and style. More than a specific number of designs, students should be able to present a variety of **feasible designs** that are significantly different in nature.

Feasible designs refer to ideas that can actually be made with the materials, resources and expertise available. Depending on the different subjects these could include the following.

- Design technology: Annotated sketches of sufficient detail to provide a visual representation of what the final product might look like.

- Computer technology: Screenshots of trial designs (mock-ups), an initial step of creation where the product is partially constructed to allow the student to develop a realistic estimate of the functionality of the software used and the time needed for the creation.

- Food technology: Annotated diagrams and/or sketches or recipes. Annotations show the purpose and description of the food product/solution. Recipe designs should be analysed against the design specification and modified, when deemed necessary, to suit the challenge.

In all cases a written evaluation of each idea against the list of design specifications that was developed in the investigation stage is required. Students are expected to justify the choice of the chosen design based on its evaluation, with detailed comments explaining the ways in which each specification has been addressed.

What are the expectations of the plans that students develop?

Students are expected to produce a working plan with clear and detailed steps that would allow any other person who follows it to potentially create the product/solution.

The plan should include an indication of the amount of time needed for completing each stage as well as the resources and equipment required for each stage. In computer technology, resources can include text, graphics, codes, media files, and so on, with appropriate citations if they are not the original work of the

student. It is important that the plan is evaluated to ensure that it can be followed and that any foreseeable changes to the plan or the design are justified based on this evaluation. However, at this stage of the design cycle the evaluation of the plan is of a speculative nature; the plan is not evaluated as a result of being used to create the product/solution.

What is considered acceptable evidence of creation in the products/solutions submitted by students?

It is important to remind teachers that year 5 students are expected to produce products/solutions that are sophisticated enough to reflect the level of skill acquisition over a five-year period.

Acceptable evidence of creation can vary according to the product/solution and to the branch of technology in question. However, students are always expected to provide evidence of creation throughout the entire creation process. Examples of acceptable evidence include a photograph or a video for design and food technology, and screenshots and/or copies of the different stages of the product/solution for computer technology.

What evaluations should students carry out to achieve the highest levels of criterion E, evaluate?

Students are expected to evaluate both their final product/solution and their own personal performance throughout the design cycle.

Students must evaluate the final product/solution using the tests designed in the investigation stage. This evaluation must be justified and based on valid conclusions derived from the results of tests against the design specification. Therefore the product/solution evaluation should include the feedback from intended users and an analysis of the test results, including a reflection on how the product/solution could impact on life, society and/or the environment. For example, students could answer the question, "*What is the impact of the product/solution I have created?*"

Students should also evaluate their performance at each stage of the design cycle. Students could answers questions such as: "*What was done well?*" "*What was done not so well?*" "*What could be improved?*"

Moderation

In MYP technology, what are the options for subject registration for IB-validated final grades? What should be included in the moderation sample and what subject will appear in the students' records of achievement?

The options for registration for MYP technology have not changed. These are computer technology, design technology and technology. The subject registration must reflect the course or courses in which the students have been engaged and in which they wish to receive IB-validated final grades.

Students taking a design technology course and wishing to receive IB-validated grades in design technology must be registered in design technology. The moderation sample must consist of two design technology units of work. The record of achievement will read "design technology".

Students taking a computer technology course and wishing to receive IB-validated grades in computer technology must be registered in computer technology. The moderation sample must consist of two computer technology units of work. The record of achievement will read "computer technology".

Students taking both computer technology and design technology courses and wishing to receive IB-validated grades in both subjects must register in both computer technology and design technology. Schools must send two moderation samples, one for design technology (two design technology units of work) **and** one for computer technology (two computer technology units of work). The record of achievement will read "design technology **and** computer technology".

Students taking a combined technology course and wishing to receive IB-validated grades in this course must be registered in technology. Schools must send a moderation sample for technology consisting of either two technology units of work, or one design and one computer technology unit of work. The record of achievement will read "technology".

Students participating in an integrated technology course should follow the conditions for subject integration of technology as outlined in the "Requirements" section of this guide. Please note that schools are expected to document how the conditions for subject integration have been met in the background information. For more information on this, please refer to "Integration across subject groups" in the *MYP coordinator's handbook*, section D.

What can I do if my questions are not answered here?

Your MYP coordinator may be able to answer your questions. If not, posting a message on the online curriculum centre (OCC) can often prompt answers from other teachers in the MYP world. Alternatively, your coordinator may pass your query on to be answered by the IB.

MYP technology glossary

Analyse	To identify parts and relationships, and interpret information to reach a conclusion.
Appropriate quality	This is the best product/solution that the student can produce, taking into account the resources available, the skills and techniques he or she has used, his or her educational development, how the product/solution addresses the identified need, and aspects of safety and ergonomics.
Brainstorm	A creative-thinking technique, usually used by groups, to generate as many ideas as possible in response to a question or problem.
Computer-aided design (CAD)	Computer software used in the design process of engineering projects.
Challenge	A description of the task as it is presented to the students. It should describe the problem to be addressed and may refer to key features included in the design specification.
Computer technology	A subject that uses the design cycle to solve problems through the use of computers. MYP computer technology enables students to create computer-generated products/solutions to perform a task or meet a need. This is different from using computers as an approaches to learning (ATL) tool. Examples of computer technology products/solutions can be multimedia packages and programming.
Context	The scenario within which the technology project will take place. This may be real or imaginary but should always be authentic (represent needs and processes experienced in the real world). It will often contain elements to be considered in the design specification, and may reflect a chosen area of interaction.
Describe	To give a detailed account.
Design brief	The student's response to the challenge, showing how he or she intends to solve the problem he or she has been presented with. This will guide his or her investigation as he or she works to develop a more detailed design specification.
Design cycle	The series of stages students use in all MYP technology-related learning. The four stages of the design cycle are: investigate, plan, create and evaluate.
Design folder	A compilation of evidence that accompanies the final product for a unit of work. Students formally organize the results of their investigations, their various designs, plans and evidence for creation, their reflections during the creation stage and their evaluations of the final product/solution.
Design specification	A detailed description of the conditions, requirements and restrictions with which a design must comply. This is a precise and accurate list of facts, such as conditions, dimensions, materials, process and methods, that are important for the designer and for the user. All appropriate solutions will need to comply with the design specification.

Design technology	A subject that uses the design cycle to solve problems through the use of tools and materials. MYP design technology enables students to use a variety of materials in the creation of a product/solution to perform a task or meet a need. Examples of products/solutions include a toy that improves motor skills for children, a system that can recycle aluminium drink cans, and a new or improved food product for specific dietary needs.
Discuss	To give an account including, where possible, a range of arguments for and against the relative importance of various factors and comparisons of alternative hypotheses.
Document	To "document" work is to fully credit all sources of information used through referencing and the bibliography according to one recognized academic convention.
Ergonomics	The study of the interface between humans and their human-made environment.
Evaluate	To assess the implications and limitations; make judgments about the value of ideas, works, solutions or methods in relation to selected criteria.
Explain	To give a clear account including causes and reasons or mechanisms.
MYP technology taught within other subjects of the curriculum	A course where technology is taught not as a discrete subject but within other subjects of the curriculum. This course must use the design cycle to develop technological products/solutions to problems based in a non-technology subject where the aims and objectives of MYP technology are met.
Product testing	A stage in the design process where versions of products (for example, prototypes) are tested against the need, applied to the context and presented to the end-user or target audience.

Technology teacher support material
Example interim objectives

Objectives for years 1, 3 and 5 of the Middle Years Programme

Year 5 objectives

The technology objectives for year 5 of the Middle Years Programme (MYP) are already in place and can be found in this guide. This set of **prescribed** objectives forms the basis for the **assessment criteria**, also published in the guide, which must be used for the final assessment of students' work during year 5.

Example interim objectives

Example interim objectives for years 1 and 3 of the MYP appear in the tables that follow. They have been developed in order to:

- promote articulation between the MYP and the Primary Years Programme (PYP)

- support individual schools in developing a coherent curriculum across the five years of the programme (or however many years a school is authorized to offer)

- emphasize the need to introduce students to the required knowledge, understanding, skills and attitudes from the first year of the programme

- provide examples of possible learning experiences and assessment tasks that will allow students to work towards meeting the final objectives for year 5

- support schools that are authorized to offer the first three years of the MYP in designing appropriate assessment tasks for the end of the third year.

Unlike the objectives for year 5, the interim objectives for years 1 and 3 are not prescribed, although the IB recommends that all schools use them. Schools may choose to adopt the objectives contained in this document or develop their own.

If choosing to develop their own interim objectives, schools should start with the prescribed objectives for year 5 and modify each one by taking into account the age, prior knowledge and stage of development of students in an earlier year of the programme. Each year 5 objective will then correspond directly to a modified objective in a preceding year of the programme. **No objectives should be omitted** from an earlier year as it is vital to ensure a coherent progression of learning across all five years of the programme.

MYP units of work

Examples of possible learning experiences are provided in the tables that follow. Each learning experience is intended to form part of a larger unit of work designed to address a central question or theme, known as the **MYP unit question**. More information about MYP units of work can be found in the section on "Planning for teaching and learning" in *MYP: From principles into practice* (August 2008).

Within each unit of work, the **context for learning**, **significant concept(s)** and **assessment tasks** are defined in relation to the MYP unit question. The areas of interaction provide the context for learning while the significant concepts refer to the underlying concepts that define the principal goal of the unit. Assessment tasks are designed to address the levels of students' engagement with the MYP unit question and the aligned objectives.

Tables of objectives

Investigate

Year 1	Year 3	Year 5
At the end of the first year, students should be able to:	At the end of the third year, students should be able to:	At the end of the course, students should be able to:
Students identify the problem to be solved		
• consider the problem within a wider context[1]	• consider the importance of the problem for life, society and/or the environment[2]	• evaluate the importance of the problem for life, society and the environment
• understand the concept of a design brief and adapt a given design brief to the problem or, with guidance, start to develop a design brief.	• outline a simple design brief.	• outline the design brief.
Students develop the design brief		
• ask useful questions about the investigation[3]	• ask relevant questions at the different stages of the investigation	• formulate and discuss appropriate questions that guide the investigation
• with guidance, identify appropriate sources of information and acknowledge these in a suitable format	• identify appropriate sources of information and acknowledge these using a recognized convention	• identify and acknowledge a range of appropriate sources of information
• with guidance, use different systematic methods to collect and select information, and to organize it logically	• collect and select information, organize it logically and, with guidance, begin to analyse it	• collect, analyse, select, organize and evaluate information
• understand the importance of questioning the value of sources of information.	• consider, with guidance, the value of sources of information.	• evaluate the sources of information.
Students formulate a design specification		
• understand the concept and importance of the design specification and, with guidance, list the requirements that must be met by the product/solution	• list, with limited guidance, the specific requirements that must be met by the product/solution	• list the specific requirements that must be met by the product/solution
• understand the importance of testing to determine the success (or otherwise) of the product/solution and, with guidance, design some simple tests.	• design, with limited guidance, tests to evaluate the product/solution against the design specification.	• design tests to evaluate the product/solution against the design specification.

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[1] Students should first understand that the role of technology is to provide solutions to problems and, with guidance from the teacher, they should be given opportunities to explore different types of problems that are relevant to them and/or their environment.
[2] Students should be given opportunities to identify problems that could be solved using technology before discussing the implications for life, society and/or the environment.
[3] The research questions should be based on the nature and type of materials, the tools, techniques and equipment and whether there are similar existing products.

Examples of possible learning experiences		
Identify the problem to be solved Students could: • discuss the issues surrounding a particular problem • discuss the formats of exemplar design briefs • adapt a design brief linked to a similar problem • complete a design brief that has been started • develop a simple design brief with guidance.	**Identify the problem to be solved** Students could: • identify design problems that affect life, society and/or the environment • identify designs that can be tailored to specific users • write a design brief answering what, who, where and how questions.	**Identify the problem to be solved** Students could: • consider problems and their solutions in relation to their possible impact on life, society and the environment • independently formulate questions when investigating a problem • devise problems and develop design briefs • identify and take into account the specific needs of users.
Develop the design brief Students could: • describe different sources of information • investigate research questions • reference sources of information • produce a list of resources • create a "rich picture" containing, for example, symbols, keywords, cartoons, sketches, pictures, a title • design a simple questionnaire • create a mood board • learn how to use the Internet safely by acting responsibly and critically.	**Develop the design brief** Students could: • identify websites, library resources and people as possible sources of information • comment on the usefulness of the information selected • devise different research questions • learn how to reference and rate information sources.	**Develop the design brief** Students could: • independently identify meaningful questions • carry out literature and web searches, develop questionnaires and survey selected audiences • select and organize appropriate sources and evaluate them.
Formulate a design specification Students could: • identify one or more constraints • carry out a given test on a product/solution and record the result.	**Formulate a design specification** Students could: • identify major constraints • select the most important information from their research with a view to writing design specifications.	**Formulate a design specification** Students could: • identify ways of testing a solution or product on a specific audience or the intended user • produce a listing of detailed specifications.

Plan

Year 1	Year 3	Year 5
At the end of the first year, students should be able to:	At the end of the third year, students should be able to:	At the end of the course, students should be able to:
Students design the product/solution		
• create designs and communicate them using different forms and conventions	• generate a range of designs that attempt to meet the design specifications	• generate several feasible designs that meet the design specification
• compare the designs against the design specifications	• compare the designs against the design specifications and identify the pros and cons of each design	• evaluate the designs against the design specification
• select, with guidance, one design over the others.	• select one design and explain its choice.	• select one design and justify its choice.
Students plan the product/solution		
• describe, with guidance, the steps needed to create the product/solution	• devise, with guidance, a series of logical steps to create the product/solution	• construct a plan to create the product/solution that has a series of logical steps
• construct a plan to create, with guidance, the product/solution that makes effective use of resources and time	• construct a plan to create the product/solution that makes effective use of resources and time	• construct a plan to create the product/solution that makes effective use of resources and time
• with guidance, consider the effectiveness of the plan and make suitable modifications.	• analyse the plan and explain the need for any modifications to the design.	• evaluate the plan and justify any modifications to the design.
Examples of possible learning experiences		
Design the product/solution Students could: • produce sketches • develop storyboards • make use of annotations • use basic computer-aided design (CAD) tools • devise working drawings • consider a variety of shapes • participate in brainstorming activities.	**Design the product/solution** Students could: • develop computer-aided design (CAD) drawings • make a set of dimensioned working drawings • draw detailed sketches • build 3-dimensional or pictorial models • make use of screenshots • consider different assembly techniques • create a model • take appropriate measurements.	**Design the product/solution** Students could: • make sketches of computer-aided design (CAD) drawings • make use of modelling techniques • make use of dimensioning strategies • produce detailed working drawings • create "how to" diagrams • take part in brainstorming activities • make use of graphics software packages • investigate package design and presentation.
Plan the product/solution Students could: • develop a basic time line • write instructions for making/using the product/solution • devise a flow chart	**Plan the product/solution** Students could: • select suitable resources and/or techniques with guidance • consider software options • consider the process	**Plan the product/solution** Students could: • make use of Gantt charts • devise complex time lines • devise a net • produce detailed flow charts

• describe a process in the form of a recipe • follow an instruction sheet • foresee possible problems.	• consider what equipment is needed • produce a step-by-step instruction sheet for creating the product/solution • devise pattern markings and layout • select appropriate materials • consider the areas that may cause problems.	• consider appropriate materials and resources • consider problem areas and make any necessary adjustments.

Create

	Year 1	Year 3	Year 5
	At the end of the first year, students should be able to:	At the end of the third year, students should be able to:	At the end of the course, students should be able to:
Students use appropriate techniques and equipment			
	• use different techniques and equipment, with guidance	• use appropriate techniques and equipment competently	• use a range of appropriate techniques and equipment competently
	• ensure a safe working environment for themselves and others.	• ensure a safe working environment for themselves and others.	• ensure a safe working environment for themselves and others.
Students follow the plan			
	• understand the importance of plans and, with guidance, follow the plan to produce the product/solution	• follow the plan to produce the product/solution with minimal guidance	• follow the plan to produce the product/solution
	• understand the importance of monitoring progress and revisiting the plan and, with guidance, making necessary changes.	• review the plan and explain any changes to the plan (when necessary).	• evaluate the plan and justify any changes to the plan (when necessary).
Students create the product/solution			
	• create, with some guidance, a product/solution of appropriate quality.	• create a product/solution of appropriate quality.	• create a product/solution of appropriate quality.
Examples of possible learning experiences			
	Use appropriate techniques and equipment Students could: • give examples of safe working practices/habits • learn about the principles of food hygiene.	**Use appropriate techniques and equipment** Students could: • demonstrate ways of working safely • consider health issues when working with specific pieces of equipment (for example, computers).	**Use appropriate techniques and equipment** Students could: • select and use equipment and/or techniques independently • select and utilize appropriate software • make appropriate choices of materials.
	Follow the plan Students could: • be given basic procedures and instructions to follow • suggest ways of improving a set of instructions.	**Follow the plan** Students could: • follow their own instructions • record any design modifications that are needed • utilize selected software applications • follow a recipe.	**Follow the plan** Students could: • follow detailed logical steps created by themselves or other students • make independent changes to designs • justify all decisions.

Create the product/solution	Create the product/solution	Create the product/solution
Students could:	Students could:	Students could:
• work to produce a product/solution of quality appropriate to year 1 • keep a process journal with detailed entries.	• work to produce a product/solution of quality appropriate to year 3 • keep a process journal with detailed entries • apply a suitable finish to the product.	• work to produce a product/solution of quality appropriate to year 5 • keep a process journal with regular detailed entries, including critical evaluations of their work • select and apply a suitable finish to the product.

Note: Appropriate quality is the best quality that can be produced, taking into account the resources available, the skills and techniques they have learned, their educational development, how the product/solution addresses the identified need and aspects of safety and ergonomics.

Evaluate

Year 1	Year 3	Year 5
At the end of the first year, students should be able to:	At the end of the third year, students should be able to:	At the end of the course, students should be able to:
Students evaluate the product/solution		
• carry out or follow tests, with guidance, to compare the product/solution against the design specification	• carry out tests to compare the product/solution against the design specification	• carry out tests to evaluate the product/solution against the design specification
• consider the success (and/or failure) of the product/solution based on testing, their own views and the views of the intended user	• consider the success (and/or failure) of the product/solution in an objective manner based on testing, their own views and the views of the intended user	• evaluate the success of the product/solution in an objective manner based on testing, their own views and the views of the intended user
• consider, with guidance, the impact of the product/solution on individuals and/or on society	• consider the impact of the product/solution on individuals and/or on society	• evaluate the impact of the product/solution on individuals and on society
• explain, with guidance, how the product/solution could be improved.	• explain how the product/solution could be improved.	• explain how the product/solution could be improved.
Students evaluate their use of the design cycle		
• reflect on their performance at each stage of the design cycle	• reflect on their performance at each stage of the design cycle	• evaluate their performance at each stage of the design cycle
• identify and describe the parts they found easy and the parts that proved difficult. With guidance, suggest ways in which their performance could be improved.	• identify the parts they found difficult and suggest ways in which their performance could be improved.	• suggest ways in which their performance could be improved.
Examples of possible learning experiences		
Evaluate the product/solution Students could: • devise star diagrams • take photographs • answer questions on the success of the product/solution • test programs • test their product/solution • comment on the work of others • take part in competitions • participate in blind tasting.	**Evaluate the product/solution** Students could: • devise simple tests • take photographs during testing • develop questionnaires for product testing • suggest product improvements • produce a graph showing test results • test a website, animation or computer program • arrange audience testing.	**Evaluate the product/solution** Students could: • develop a range of tests that focus on the user • publish a website on the Internet • report on the potential impact of marketing the product/solution • make use of feedback from users • detail improvements in the making of the product • hold a fashion show • demonstrate the product/solution to the public.

Evaluate their use of the design cycle	**Evaluate their use of the design cycle**	**Evaluate their use of the design cycle**
Students could:	Students could:	Students could:
• produce a time plan for a similar product/solution • comment on how good they think their performance was at each stage of the design cycle • suggest ways in which they could become more efficient.	• evaluate their personal performance at each stage of the design cycle • reflect on their time management skills • suggest ways in which they could become more efficient and/or raise their productivity levels • make meaningful entries in their process journals.	• respond to questions relating to, for example, how to factor time into the design cycle, how good they think their performance was at each stage of the design cycle, which processes they found easy or difficult • keep a chart (for measuring or illustrating the time left before an event).

Attitudes in technology

This objective goes beyond technology and refers to encouraging attitudes and dispositions that will contribute to students' development as caring and responsible individuals and members of society.

This objective is set in the context of the technology class (and it is also present in MYP sciences as "Attitudes in science") but will pervade other subjects and life outside school. It includes notions of safety and responsibility when working in technology as well as respect for and collaboration with others and their shared environment.

Year 1	Year 3	Year 5
Throughout the course, students should:	Throughout the course, students should:	Throughout the course, students should:
• carry out units of work in technology using materials and techniques safely and responsibly	• carry out units of work in technology using materials and techniques safely and responsibly	• carry out units of work in technology using materials and techniques safely and responsibly
• work effectively as members of a team, collaborating, acknowledging and supporting the views of others	• work effectively as members of a team, collaborating, acknowledging and supporting the views of others	• work effectively as members of a team, collaborating, acknowledging and supporting the views of others
• provide evidence of personal engagement with the subject (motivation, independence, general positive attitude) when working in technology.	• provide evidence of personal engagement with the subject (motivation, independence, general positive attitude) when working in technology.	• provide evidence of personal engagement with the subject (motivation, independence, general positive attitude) when working in technology.

Context for learning

Every MYP unit of work has an approaches to learning (ATL) component: a shared and agreed set of skills that all teachers develop with their students throughout the entire programme. The context that frames a particular unit of work is generally derived from one of the other four areas of interaction (AOI), although ATL might be the specific context on some occasions. The examples of possible assessment tasks listed are all set in the context of one or more areas of interaction.

Planning an interdisciplinary unit in collaboration with other subject teachers is also a possibility and several of the student activities listed offer this possibility.

Assessment tasks

One of the first stages in planning a unit of work is to design **summative assessment tasks**, linked to the MYP unit question, which provide varied opportunities for students to demonstrate their knowledge, understanding, skills and attitudes. It is also important to include ongoing **formative assessment tasks** within a unit of work as these provide valuable insights into the extent of student learning as the unit of work progresses. Some examples of possible assessment tasks are described in the table that follows. Each assessment task is intended to be integrated into a unit of work and may therefore be regarded as a formative or summative assessment task depending on the MYP unit question being explored.

Examples of possible assessment tasks		
Year 1	Year 3	Year 5
Students are asked to create a media campaign to show seasonal changes in their environment. Students could explore developing a product/solution that uses powerful images to illustrate seasonal changes. Students could explore some basic features of Photoshop to rework digital images of nature (for example, autumn leaves) captured from the local environment. This task would involve students taking digital images around campus and then uploading them for simple manipulation using Photoshop (textures, shading, simple layers). Guidance should be given to students at each stage of the design cycle to ensure they understand and meet the objectives for each stage before moving on to the next stage. AOI context: environments, approaches to learning	Students are expected to identify a specific need of their immediate social community outside the school. Students are expected to develop a product/solution to raise awareness of this need in the community. Students could create a simple website that informs students of community and service opportunities. The website should include an index of the organizations (both local and global) in alphabetical order, with links to the full contact information (for example, a link to the Amnesty International website). Some guidance should be given to students at each stage of the design cycle to ensure they are meeting the objectives for each stage before moving on to the next stage. AOI context: community and service	Students are expected to find out whether their school would comply with health and safety regulations for schools in the district. Students could create digital videos that examine some aspect of health and/or the environment of their campus. For instance, how accessible their school is to people with disabilities or how pollution is dealt with on their campus (litter, recycling). These videos could be presented to the whole school to create awareness and foster responsibility among students. The digital video should be of high quality and include an introduction to the topic, background music, scripts and end credits with proper citation. Minimal guidance should be given to students at this stage as they are expected to be familiar with the stages of the design cycle and able to work independently. AOI context: health and social education
Students are asked to communicate to a group of parents if the school cafeteria gives students options to make healthy choices. Students could create nutrition podcasts about the nutritional value of the food served in their school cafeteria. Research for the podcasts could include interviews with the cafeteria staff and an analysis of the nutritional value of the food. The podcast should then incorporate this information into a two-minute podcast segment. Guidance should be given to students at each stage of the design cycle to ensure they understand and meet the objectives for each stage before moving on to the next stage. AOI context: health and social education	Students are asked to help an MYP year 1 teacher to introduce his/her students to the areas of interaction using a fun and engaging strategy. Students could use GarageBand (or similar software for the PC such as Monaco or Acoustica Mixcraft) to write an AOI rap song. The song should include background music and lyrics that explain what each AOI is about. These should then be presented on an AOI day. Some guidance should be given to students at each stage of the design cycle to ensure they are meeting the objectives for each stage before moving on to the next stage. AOI context: community and service	Students are asked to prepare a portfolio to communicate their achievements to a hiring agency or to their future high school teachers or to their parents. Students could create a website that would serve as an online portfolio (password protected) to showcase their work from other subjects in order to have an overview of their learning and to better communicate their learning to others. The website should include a home page that reflects the personality of the student (a short video clip of themselves). It should also include a link to their other subjects with samples and descriptions of their work (scanned in, printed to PDF or photographed digitally and linked). Minimal guidance should be given to students at this stage as they are expected to be familiar with the stages of the design cycle and able to work independently. AOI context: approaches to learning