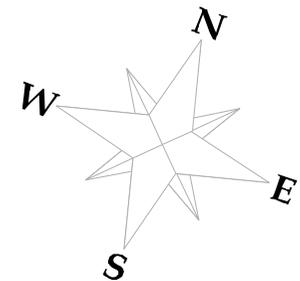


# The Malaysian Smart School

An MSC Flagship Application

*A Conceptual Blueprint*



Smart School Project Team

**Smart School Project Team**

**Creation date : 4 April, 1997**

**Last update date : 11 July, 1997**

**Related Documents**

Smart School Implementation Plan

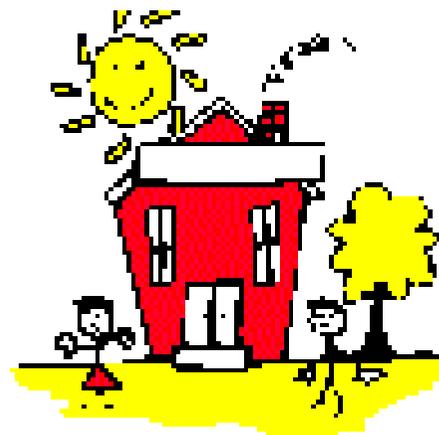
Smart School Conceptual Request For Proposals (Concept RFPs)

# Smart School Conceptual Blueprint

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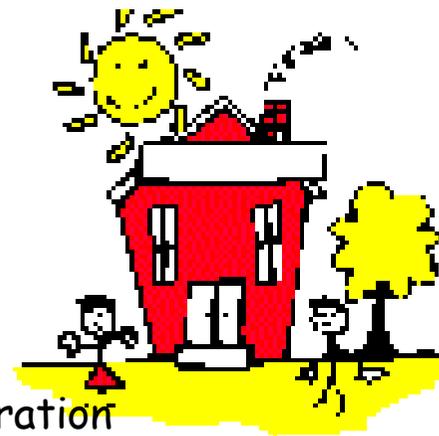
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# The Malaysian Smart School Introduction

## Introduction

Early in 1996, the Ministry of Education was involved in intense discussion about Smart Schools : the concept and its implications on the Malaysian education system. By late 1996, the Smart School had become one of the seven flagship applications of the Multimedia Super Corridor. In January 1997, the Ministry of Education conceptualised the vision of the Malaysian Smart School in the document Smart Schools in Malaysia: A Quantum Leap (Appendix 1). This Blueprint is an elaboration and refinement of that vision and its features.

A project team, comprising industry representatives, Multimedia Development Corporation officers, and officers of the Ministry of Education, worked at producing this Blueprint. The team was convened in February 1997 and continued its work until June 1997. The team was charged with the task of proposing the necessary guidelines for launching the Smart School.

A set of golden rules were developed to guide the team, so that, despite representing various interests, the team would be united in working towards common national goals. Team members worked collaboratively by ensuring their solutions are acceptable to all members, creating visionary solutions, and practising open communication within the team. In addition, they were also guided by confidentiality provisions that prevented vendor competition. A set of these rules are attached in Appendix 2.

To produce this Blueprint, the team drew on various kinds of resources. Team members made study visits to Smart Schools in various parts of the world and reported on their findings. The combined resources of the team produced an extensive bibliography of publications on the philosophy, concepts and planning of Smart Schools.

## Introduction (continued)

This Blueprint reflects the Malaysian Smart School concept. It should be read together with the **Malaysian Smart School Implementation Plan** and the **Concept Requests for Proposals (CRFPs)**. These documents enable companies to respond and participate in the Smart School system to be established. The CRFPs present a set of requirements to guide companies to use their creativity and initiative to produce the best sets of applications for Malaysia's Smart Schools.

In addition to using the expertise and experience of team members, the team also sought the advice of a wide range of experts in the fields of education and industry.

The Smart School Steering Committee of the Ministry of Education deliberated on an earlier draft of this Blueprint and provided useful insights and comments towards its finalisation.

In producing this Blueprint, the team gratefully acknowledges the help of various agencies and individuals. The team would especially like to thank the following:

- the Minister of Education, senior officials of the Ministry of Education, members of the Steering Committee;

- various Divisions of the Ministry of Education for providing professional input and facilities;

- those who helped develop a framework of pedagogy for Smart Schools;

- parents and members of the public for providing important feedback on the draft Blueprint;

- those who helped arrange visits to schools in various countries;

- the companies which contributed towards equipping the project team rooms with hubs, computers, printers, software and peripherals.

# The Malaysian Smart School Executive Summary

**Executive Summary**

Malaysia intends to transform its educational system, in line with and in support of the nations drive to fulfil Vision 2020. This Vision calls for sustained, productivity-driven growth, which will be achievable only with a technologically literate, critically thinking work force prepared to participate fully in the global economy of the 21st century. At the same time, Malaysias National Philosophy of Education calls for developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally, and physically balanced and harmonious. The catalyst for this massive transformation will be technology-supported Smart Schools, which will improve how the educational system achieves the National Philosophy of Education, while fostering the development of a work force prepared to meet the challenges of the next century.

Transforming the educational system will entail changing the culture and practices of Malaysias primary and secondary schools, moving away from memory-based learning designed for the average student to an education that stimulates thinking, creativity, and caring in all students, caters to individual abilities and learning styles, and is based on more equitable access. It will require students to exercise greater responsibility for their own education, while seeking more active participation by parents and the wider community.

The Smart Schools initiative is one of the seven flagship applications that are part of Malaysias Multimedia Super Corridor (MSC) project. The Government of Malaysia aims to capitalise on the presence of leading-edge technologies and the rapid development of the MSCs infrastructure to jump-start deployment of enabling technology to schools. This will be done by creating a group of 90 pilot Smart Schools by 1999 that will serve as the nucleus for the eventual nation-wide rollout of Smart School teaching concepts and materials, skills, and technologies. By 2010, all 10,000 of Malaysias primary and secondary schools will be Smart Schools.

This Blueprint - like the Smart School concept itself - is a work in progress and remains open to evolutionary refinement, including advances in pedagogy and improvements in information technology. Consequently, this document is descriptive, rather than prescriptive. For a fuller understanding of the Smart School initiative, the Blueprint should be read with the Smart School Implementation Plan, which outlines the implementation process and timetable, and the Concept Requests for Proposals, which define the projects requirements.

## Executive Summary (continued)

This document summarises the Blueprint and is organised into eight sections:

- Conceptual Model
- Teaching and Learning Concepts: Guiding Principles
- Management
- Processes and Scenarios
- People, Skills, and Responsibilities
- Technology Enablers
- Policy Implications
- Concluding Remarks

### Conceptual Model

The Malaysian Smart School is a learning institution that has been systemically reinvented in terms of teaching-learning practices and school management in order to prepare children for the Information Age. A Smart School will evolve over time, continuously developing its professional staff, its educational resources, and its administrative capabilities. This will allow the school to adapt to changing conditions, while continuing to prepare students for life in the Information Age. To function effectively, the Smart School will require appropriately skilled staff, and well-designed supporting processes.

Preparing students for the Information Age depends on an integrated strategy:

**Provide all-round development with provision for individual abilities**, offering a broad curriculum for all, with electives, that is vertically integrated, multidisciplinary and interdisciplinary.

**Emphasise intellectual, emotional, spiritual, and physical growth**, concentrating on thinking, developing and applying values, and using correct language across the curriculum.

**Produce a technologically literate work force** that can think critically, encouraging thought and creativity across the curriculum and applying technology effectively in teaching and learning.

**Democratise education**, offering equal access to learning opportunities and accommodating differing learning abilities, styles, and paces.

**Increase the participation of stakeholders**, creating awareness of their roles and responsibilities and developing the skills they need for that.

**Executive Summary (continued)**

**TEACHING AND LEARNING CONCEPTS: GUIDING PRINCIPLES**

The most distinctive feature of the Smart School will be a teaching and learning environment built on international best practices in primary and secondary education. This entails aligning the curriculum, pedagogy, assessment and teaching-learning materials in a mutually reinforcing, coherent manner.

**Curriculum**

The Smart School curriculum shall be meaningful, socially responsible, multicultural, reflective, holistic, global, open-ended, goal-based and technological. It shall promote holistic learning, allowing children to progress at their own pace, and catering for students varying capabilities, interests and needs. It will seek to ensure that children are educated with critical and creative thinking skills, inculcated with appropriate values, and encouraged to improve their language proficiency. Thus, the curriculum will be designed to:

- help students achieve overall balanced development
- integrate knowledge, skills, values, and correct use of language
- state explicitly intended learning outcomes for different ability levels
- offer multidisciplinary, thematic, and continuous learning
- foster the knowledge, skills, and attitudes appropriate for success in the Information Age.

**Pedagogy**

The Smart School pedagogy will seek to make learning more interesting, motivating, stimulating, and meaningful; involve the childrens minds, spirit, and bodies in the learning process; build basic skills to prepare children for greater challenges over time; and cater for a range of needs and capabilities among the students. The pedagogy shall:

- use an appropriate mix of learning strategies to ensure mastery of basic competencies and promote holistic development
- accommodate individual different learning styles, so as to boost performance
- foster a classroom atmosphere that is compatible with different teaching-learning strategies.

**Assessment**

The Smart Schools assessment system will be distinctly different from current systems to help realise the National Philosophy of Education It shall be element-based and criterion-referenced to provide a more holistic and accurate picture of a students performance. Teachers, students and parents will be able to access on-line assessment items. Smart School assessment will be flexible and learner-friendly, while assuring the quality of the assessment information by using multiple approaches and instruments. It will lead to living certification, which will not only attest to a students cumulative accomplishments but will also be open to continued improvement on a lifetime basis.

**Executive Summary (continued)****Teaching-learning materials**

Smart Schools will need teaching-learning materials designed for the new teaching strategies. These materials will accommodate students differing needs and abilities, resulting in fuller realisation of their capabilities and potential, and allow students to take greater responsibility for managing and directing their own learning.

**MANAGEMENT**

The primary objective of Smart School management will be to manage efficiently and effectively the resources and processes required to support the teaching-learning functions. Management will help to reallocate skilled human resources to more valuable activities, save costs over the long term, improve the quality of decisions through better access to information, and accelerate decision making.

To fulfil its objectives, the Smart School management will need strong, professional administrators and teachers who can articulate school goals clearly, lead teaching at the school, and elicit strong parental and community support. They will need to maintain open communication with all constituencies, allocate resources sensibly and equitably, track school performance against financial and non-financial objectives, and provide a school environment that is conducive to learning.

Further, they will need to develop and maintain a happy, motivated and high-performing staff, ensure the security of the school and its occupants, and use and manage technology appropriately, effectively, and efficiently.

**PROCESSES AND SCENARIOS**

For a Smart School to achieve its educational objectives, its internal processes must be co-ordinated. Ensuring co-ordination entails viewing these processes as a system: if the system is well designed, providing appropriate inputs will yield the desired outputs - namely, students ready for higher education or active and productive participation in the work force. The Smart Schools initiative offers an ideal opportunity to reassess the current schooling system, identifying problems and finding potential solutions, many of which can be enabled by technology.

For the Smart School system, the major inputs are the resources - students, teachers, technology and tools - and the Ministry of Education, in the form of curriculum specification, financing, and management and control functions. The system proceeds through a series of sub-processes - identifying and localising teaching plans, selecting and organising teaching-learning materials, determining a student's entry level, planning the student's experience, holding classroom sessions, assessing achievement internally, providing feedback - before delivering the student for external achievement assessment, and ultimately for higher education or the work force.

**Executive Summary (continued)**

At a Smart School, these sub-processes will be constructed so that each delivers the desired output in an integrated manner.

**PEOPLE, SKILLS, AND RESPONSIBILITIES**

The higher degree of individualised attention for students at a Smart School will necessitate new roles and responsibilities for teachers, principals, Ministry of Education officers, support staff and parents. In fact, fulfilling these roles and responsibilities will require specialised training for each group.

**Teachers**

Teacher development will be critical to the success of the Smart School. Teachers will need intensive training in the use of information technology and in its integration into classroom activities in ways that enhance thinking and creativity. Smart School teachers will also need to learn to facilitate and encourage students in taking charge of their own learning. In the long term, these teachers will need to augment their skills regularly, if they are to stay abreast of developments in their profession and remain confident in their application of the technology.

**Principals**

The tasks of managing schools involves working with information and building on ideas collaboratively.

The efficiency and effectiveness of this management task can be enhanced significantly through the use of technology. Principals in Smart Schools will need intensive training to equip them to manage the new facilities, technologies and methodologies deployed in their schools.

**Ministry of Education Officers**

Ministry officers, comprising those at the central, state and district levels are crucial to the successful implementation of the Smart School project, because they play a major role in planning, co-ordinating, monitoring, and evaluating Ministry programmes. Officers will need to understand thoroughly the educational objectives and policies of the Smart School, the information technology being applied, the teaching-learning and management processes, and their own roles and responsibilities in that context.

**Support Staff**

The advent of new educational processes as well as advanced information technology will present real challenges for the support staff at Smart Schools. It will require creating a new position, that of Media/Technology coordinator, and it will require existing clerical staff to learn new ways of working.

**Executive Summary (continued):**

**Media/Technology Coordinator.** The coordinator's task will be to support teachers and the principal in deploying multimedia and other technologies in the Smart School. The coordinator should be an experienced teacher who also understands how best to use technology for gathering information, instruction, managing, and communicating. The coordinator will also need to assist the principal in managing software applications and in liaising with technical support staff for the maintenance and upgrading of IT facilities.

**Clerical Staff.** School clerical staff will need to build IT skills sufficiently to communicate using the new technology and perform their record keeping functions. In addition to basic IT skills, however, they will also need to understand the new educational processes, so that they can give their support wherever it is needed.

**Parents**

Parents can play a major role in helping Smart Schools provide individualised education for students. Research has shown that students do better when their parents are involved. This task will go beyond monitoring the child's progress, and providing guidance, motivation, and counsel; it will require familiarity with the new educational processes, a willingness to assist with developing teaching-learning and assessment materials, as well as the ability to access the school's public domain databases electronically.

**TECHNOLOGY ENABLERS**

Technology alone will not make a school smart. Only improved teaching-learning strategies, management and administrative processes, and capable, well trained people with enthusiasm for their work can do that. However, information technology can enable the process of transforming traditional schools into Smart Schools. Consequently, a nation-wide system of Smart Schools will depend on advanced information technology at the school, district and national levels.

**School-level technology**

Technology has many roles to play in a Smart School, from facilitating teaching and learning activities to assisting with school management. Fully equipping a school might include the following:

**Classrooms** with multimedia courseware and presentation facilities, and e-mail or groupware for collaborative work.

**Library/Media Centre** with a database centre for multimedia courseware, and network resources like access to the internet.

**Computer laboratory** for teaching, such as Computer Studies as a subject, and readily accessible multimedia and audiovisual equipment.

**Executive Summary (continued)**

**Multimedia Development Centre** with tools for creating multimedia materials and catering to varying levels of sophistication.

**Studio/Theatrette** with a control room for centralised audiovisual equipment, videoconferencing studio, preview room for audio, video, or laser disc materials.

**Teachers Room** with on-line access to courseware catalogues and databases, information and resource management systems, professional networking tools, such as e-mail and groupware.

**Administration Offices** capable of managing databases of student and facilities, tracking student and teacher performance or resources, and distributing notices and other information electronically.

**Server Room** equipped to handle applications, management databases, and web servers; provide security; and telecommunications interface and access to network resources.

The technology will enable the school to draw on a variety of external resources, while also making the school more accessible to the community. Students and teachers will be able to tap into public and university libraries; access companies and industry associations; investigate museums and other archives; keep up to date with local authorities.

Similarly, parents, students, and other members of the community can stay in touch with the school. Students can keep abreast of coursework from outside of school; parents can monitor their children's progress or communicate with teachers from home; people in the community can use the school as a centre for continued learning.

**District-level technology**

School districts will need to maintain a secure network for communicating with schools in the area and with state and national authorities, while also using the open network for less sensitive materials. Districts will also need to maintain extensive databases for many different types of information, for example, assessment records of student and teacher performance; human resource records; matters of governance, financing, and security; and educational resources.

**National-level technology**

At the national level, interconnecting Smart Schools and educational authorities will involve both open and secure networks. This will allow open access to educational resources, facilitate collaborative work, and maintain open communication channels with constituencies, while providing for the controlled distribution of sensitive information. In addition, there will need to be a national repository centre that is accessible to all education sites and maintain expedient access to the Ministry of Education and the federal government administration.

**Executive Summary (continued)**

This will require highly reliable telecommunications infrastructure to connect state and district education centres and provide international linkages. Given the Smart School initiatives status as a flagship application, the ideal place for the national repository would be in the MSC.

**POLICY IMPLICATIONS**

Implementing Smart Schools successfully in Malaysia will be a complex task, requiring changes to existing policies, procedures, and practices, both written and unwritten. It may also require formulating entirely new policies and regulations. A few of the important issues to be addressed include those outlined below, in the areas of the teaching-learning processes; management functions; people, skills and responsibilities; and technology.

**Teaching-learning processes**

**Teaching-learning.** What policies need to be amended, if students are to progress at their own pace according to their own capabilities, and if students are to be free to learn in a variety of ways?

**Assessment.** What will be the best regime for comprehensively and periodically assessing student aptitudes, and what supporting infrastructure will that require? How can tests be administered fairly in multiple ways, including on-line?

**Selection of materials.** What changes will be needed in the process for selecting teaching-learning materials to ensure that the best Smart School materials are chosen?

**Management functions**

**School governance.** What are the appropriate guidelines for intellectual property at a Smart School? Who owns the information compiled at the school, and who gets access to it? Who owns the teaching materials produced by teachers?

**Communications/public relations.** How best to achieve the rapid relaying of relevant information to and from stakeholders? What channels should be created for rapid communication with the world beyond the school and how to manage those channels?

**Executive Summary (continued)**

**People, skills and responsibilities**

What should be the minimum number of hours of on-going, annual professional development required for practising teachers, given their need to stay current with advances in information technology?

Should teachers and administrators at Smart Schools, having been trained in the use of information technology, be paid more to ensure that they stay in education?

**Technology**

What modifications need to be made to the per capita grant to accommodate start-up and on-going technology expenses?

What alternative funding sources can be harnessed to acquire additional technological inputs?

To what extent are schools allowed to add technology that is inconsistent with agreed-upon Ministry of Education guidelines and technology standards?

**CONCLUDING REMARKS**

Transforming traditional schools into Smart Schools represents a major undertaking. It will require a significant commitment of resources, but the nation will benefit from the change for many years to come. Success will require:

- support from many stakeholders, including all agencies in the educational system;

- sufficient funds to establish and maintain Smart Schools;

- appropriate policies, norms, and guidelines to support the schools;

- effective and efficient administrative practices in each school;

- sufficient deployment of information technology to enable the Smart Schools to function properly;

- continuing professional development for teachers, principals, and other educational personnel.

The Smart School initiative represents an investment in the future productivity of Malaysia's work force and a down payment on the nation's future prosperity.

# The Malaysian Smart School Conceptual Model

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The Malaysian National Philosophy of Education underpins every element of the Smart School Conceptual Model:

**Education in Malaysia is an on-going effort towards further developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious, based on a firm belief in and devotion to God. Such an effort is designed to produce Malaysian citizens who are knowledgeable and competent, who possess high moral standards, and who are responsible and capable of achieving high levels of personal well-being as well as being able to contribute to the harmony and betterment of the family, the society and the nation at large.**

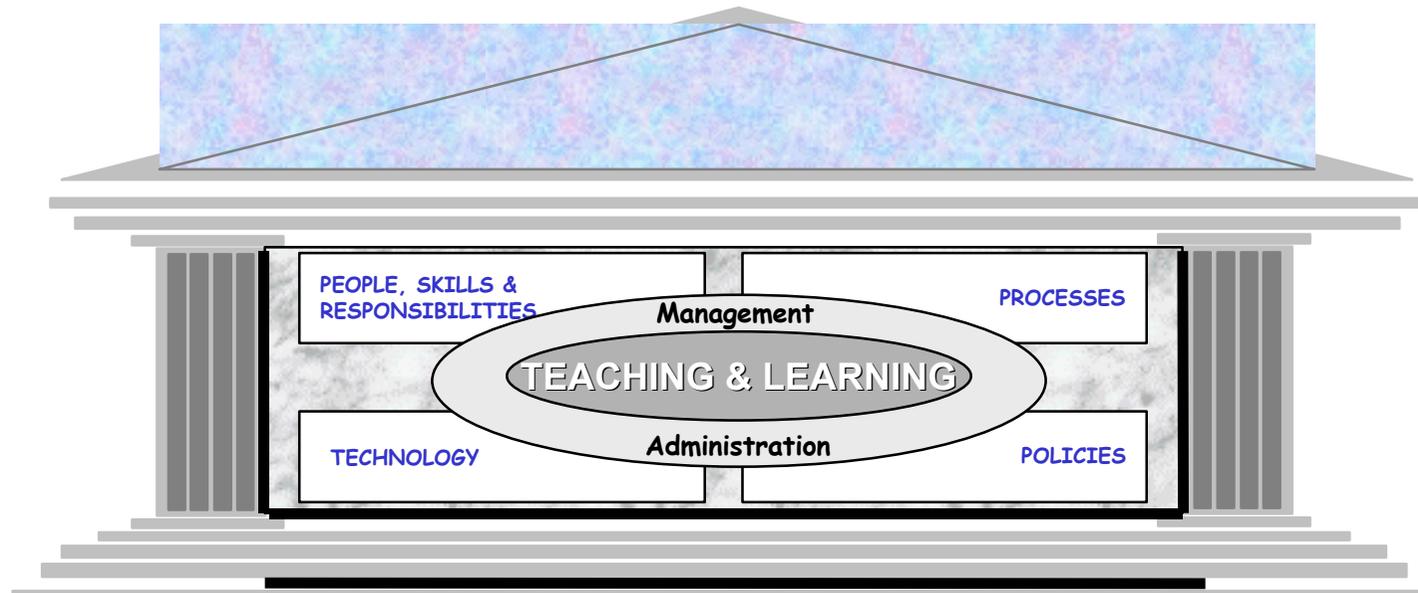
### Definition of the Malaysian Smart School:

The Malaysian Smart School is a learning institution that has been systemically reinvented in terms of teaching-learning practices and school management in order to prepare children for the Information Age.



The Malaysian Smart School has the following qualities:

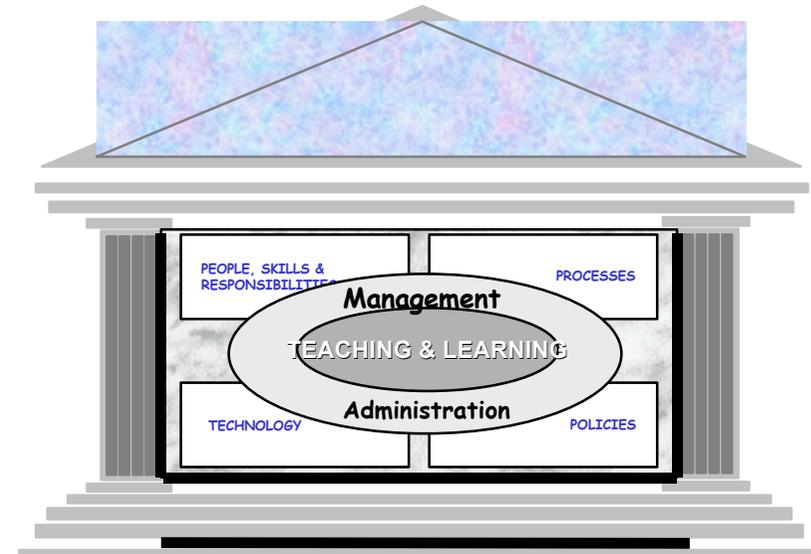
- a philosophy that says all students can learn if taught, coupled with high expectations for all students
- a broad curriculum that considers the different capabilities and needs of all students
- a school climate that is conducive to learning
- an on-going assessment that supports good instruction
- strong and professional principals and teachers
- a high level of parent and community involvement and support



## Key Components of a Smart School

### Teaching and Learning

The teaching and learning environment comprises four areas:  
 Curriculum: designed to help students achieve overall and balanced development  
 Pedagogy: allows for appropriate mix of learning strategies to ensure mastery of basic competencies and promotion of holistic development  
 Assessment: designed to give accurate feedback of students readiness, progress, achievement and aptitude  
 Teaching-Learning Materials: cognitively challenging and motivating by combining the best of network-based, teacher-based, and courseware materials



### Management and Administration

The nine primary functions of Smart School management shall efficiently and effectively manage the resources and processes required to support the teaching and learning functions

- School governance
- Student affairs
- Educational resources
- External resources
- Finance
- Facilities
- Human resources
- Security
- Technology

### People, Skills and Responsibilities

Stakeholders involved in the implementation of Smart Schools will be equipped with specific skills and requisite knowledge base to enable them to play their roles effectively.

The key groups of stakeholders include teachers, principals, Ministry of Education officers, support staff, and parents.

### Technology

Smart School practices in teaching and learning, management, and communication with external constituencies will dictate technical requirements and technology solutions

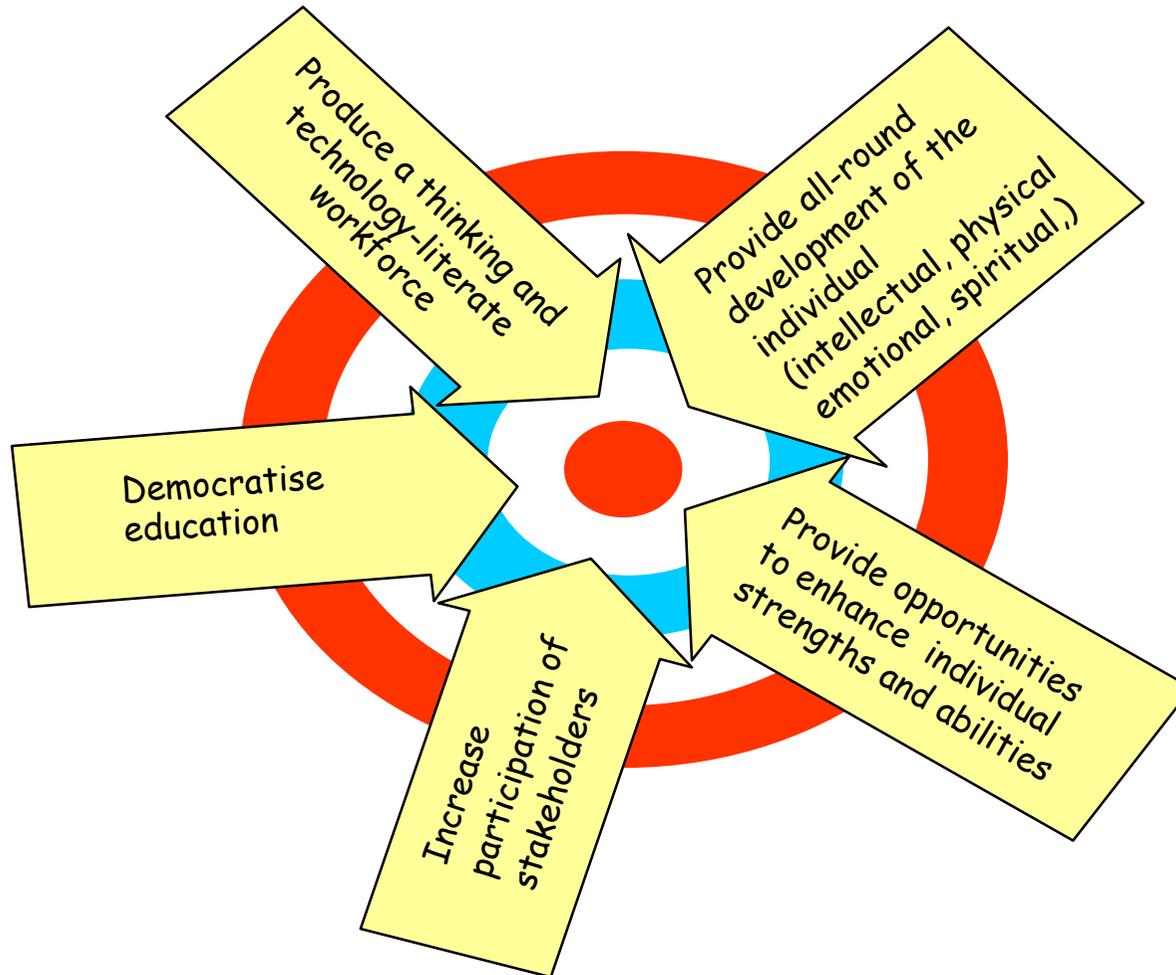
### Processes

Smart School processes are viewed as a system. When the system is provided with inputs, the Smart School processes will work to produce the desired outputs.

### Policies

To ensure the successful implementation of Smart Schools, changes in existing policies and regulations, as well as new policies and regulations will be formulated.

The Smart School initiative has five main goals which focus on the need to develop a skilled work force for the Information Age and to promote the goals of the National Philosophy of Education:



An integrated set of strategies will be employed to achieve these goals:

Goals	Strategies
<p>All round development of the individual (intellectual, physical, emotional, spiritual)</p>	<ul style="list-style-type: none"> <li>• Provide a broad curriculum for all</li> <li>• Teach values and language across the curriculum</li> <li>• Emphasise thinking skills</li> </ul>
<p>Provision to develop individual strengths and abilities</p>	<ul style="list-style-type: none"> <li>• Provide electives in the curriculum</li> <li>• Allow for vertical integration (virtual express class)</li> </ul>
<p>Produce a thinking and technology-literate workforce</p>	<ul style="list-style-type: none"> <li>• Teach thinking across the curriculum</li> <li>• Apply technology in teaching and learning</li> </ul>
<p>Democratise education</p>	<ul style="list-style-type: none"> <li>• Provide equal access to learning opportunities</li> <li>• Provide for differing abilities, styles, and paces of learning</li> </ul>
<p>Increase participation of stakeholders</p>	<ul style="list-style-type: none"> <li>• Create awareness of what happens in schools</li> <li>• Enable easy and speedy communication with the school using technology</li> <li>• Provide opportunities for stakeholders (e.g. parents, community) to participate.</li> </ul>

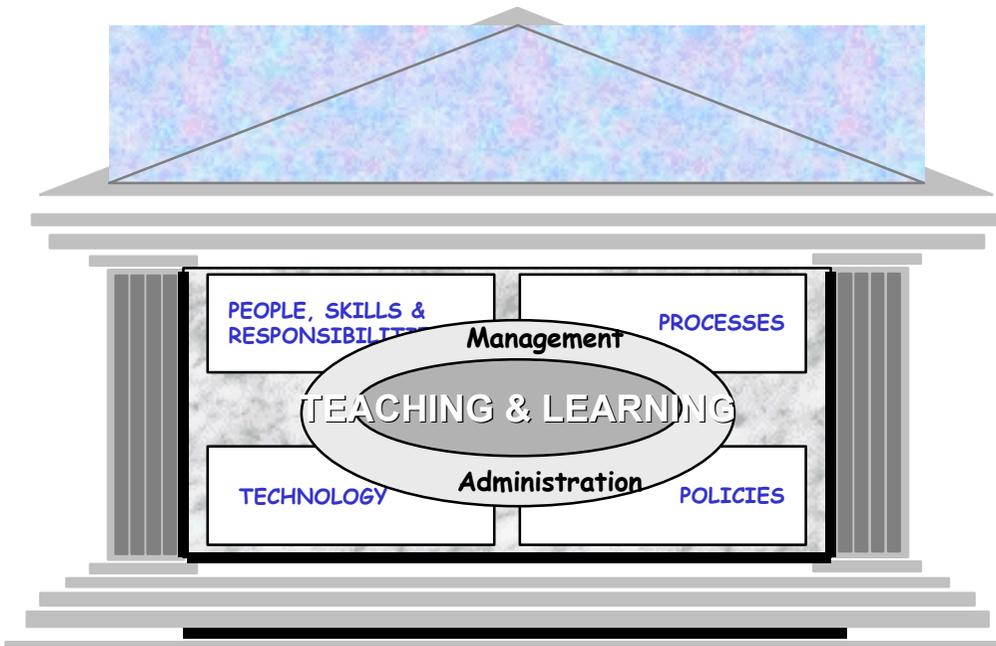
# The Malaysian Smart School Teaching and Learning Concepts: Guiding Principles

### Teaching-Learning Concepts: Guiding Principles

The purpose of this Section is to introduce the reader to the Teaching-Learning Concepts that will operate in Smart Schools in Malaysia, namely, the concepts related to Smart School Curriculum, Pedagogy, Assessment and Teaching-Learning Materials,. The characteristics, benefits, and a brief description of each of these components are included.

#### How to read this Section

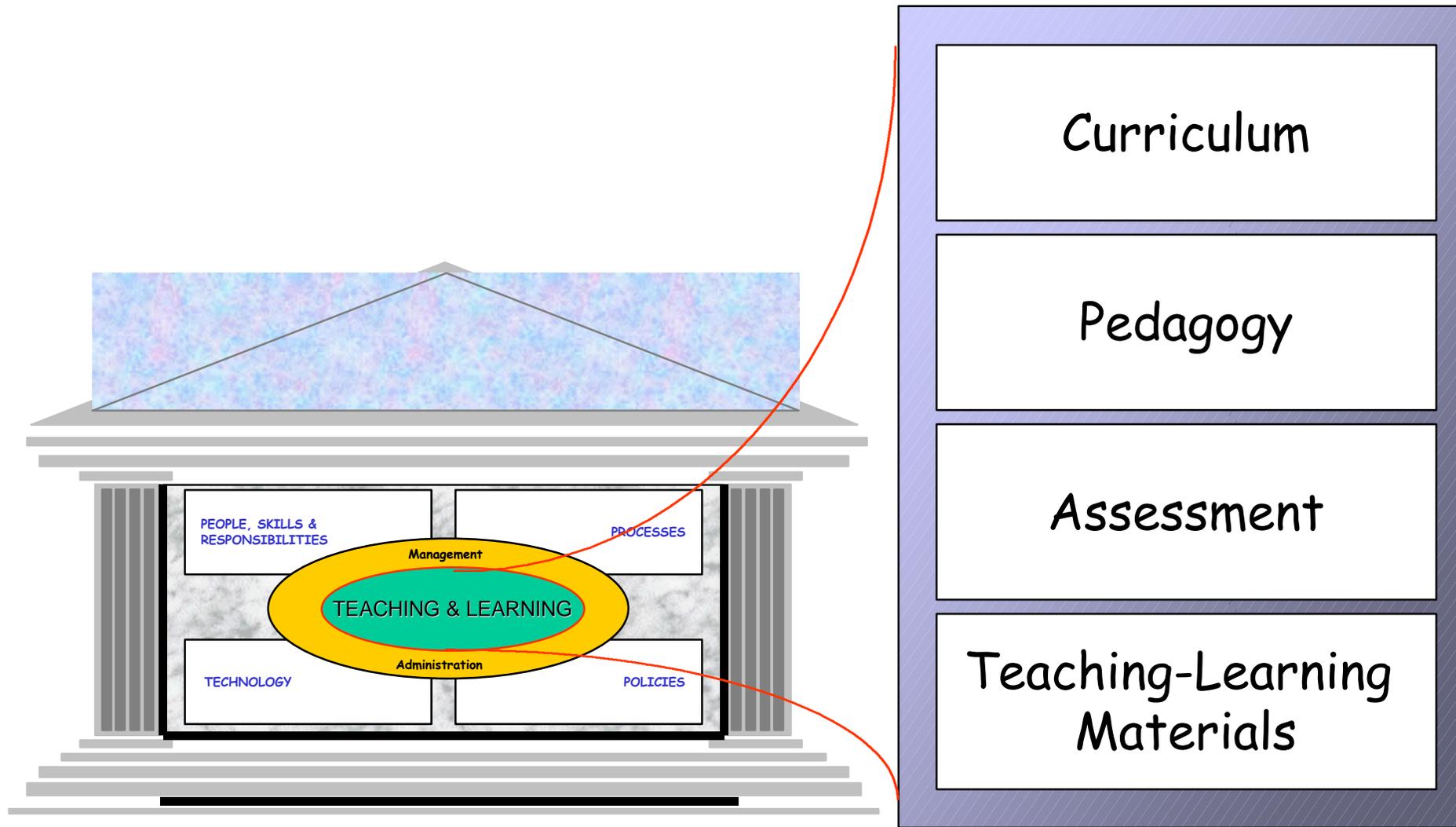
This Section begins with a description of the curriculum that will be used in Smart Schools and how this curriculum will help realise the goals of the National Philosophy of Education.. The pedagogical process, which includes learning strategies and teaching strategies that best promote the aims of the Smart School is then described. Next, the different types of teaching-learning materials that will encourage and promote learning in the Smart School, as well as the selection and evaluation of these materials are described. Finally, assessment models that will give a more accurate picture of every child's achievement and aptitudes are described.



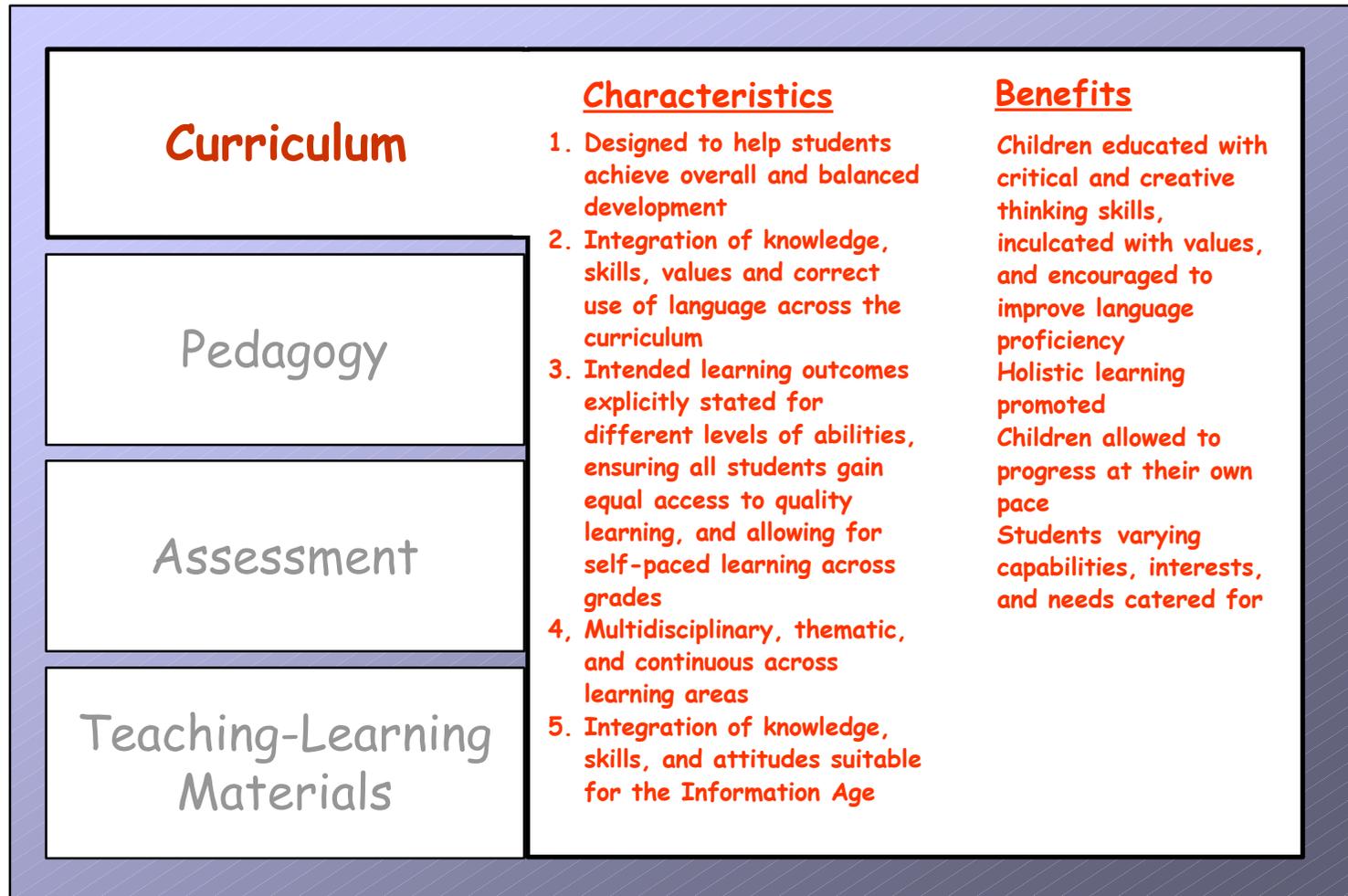
#### Related Materials

The syllabus and curriculum specifications of all the subjects that will be taught in Smart Schools. These materials are available from the Curriculum Development Centre, Ministry of Education, Malaysia

The Smart School teaching and learning environment will be shaped in four main areas, each of which will be a critical element in defining the overall teaching and learning experience for Smart School children:



The Smart School Curriculum will be designed according to best practices of other successful Smart Schools, incorporating elements that will enable the education system to achieve the goals of the National Philosophy of Education:



## The Malaysian Smart School Vision of Curriculum:

The curriculum shall be:

**MEANINGFUL.** The curriculum emphasises the active construction of meaning, so that all students find purpose in their studies.

**SOCIALLY RESPONSIBLE.** The curriculum develops in students a sense of social responsibility, so that they become aware of their obligations and duties as citizens in a democracy and are especially sensitive to the needs of the poor and the aged.

**MULTICULTURAL.** The curriculum reflects and is responsive to the cultural diversity of this nation and our community, so that students develop a sense of pride in their own heritage and a respect for that of others.

**REFLECTIVE.** The curriculum fosters in students the skills and attitudes of reflection, so that they are able to think critically, creatively, and affirmatively.

**HOLISTIC.** The curriculum gives appropriate emphasis to all the significant aspects of growth and all the types of human intelligence, helping students see the connections between the separate subjects,

**GLOBAL.** The curriculum develops in students an awareness of global interdependence in all aspects of life, including the environment and the economy.

**OPEN-ENDED.** The curriculum is open-ended in two ways: it is open to revision and continued refinement; and it provides open access to all students, allowing them to go beyond explicitly stated learning outcomes in curriculum documents.

**GOAL-BASED.** The curriculum focuses on significant goals, so that all students, including those with special needs, develop the critical skills and acquire the knowledge they need for effective lifelong learning and full functioning as citizens in a changing society.

**TECHNOLOGICAL.** The curriculum uses technology as one delivery system, examines the influence of technology on students lives, and gives students the skills they need to use technology.

New elements in the Smart School curriculum will focus on all-round development of students appropriate for the Information Age:

- 1. Designed to help students achieve overall and balanced development

# ALL-ROUND DEVELOPMENT

## Domains

### Communication

Effective oral and written communication in Malay. English as a second language. Emphasise multiple languages, interpersonal skills and networking.

### Cognitive

Focus on acquiring knowledge. Focus on searching, generating, and using knowledge with an emphasis on problem-solving and creativity.

### Affective/ Emotional

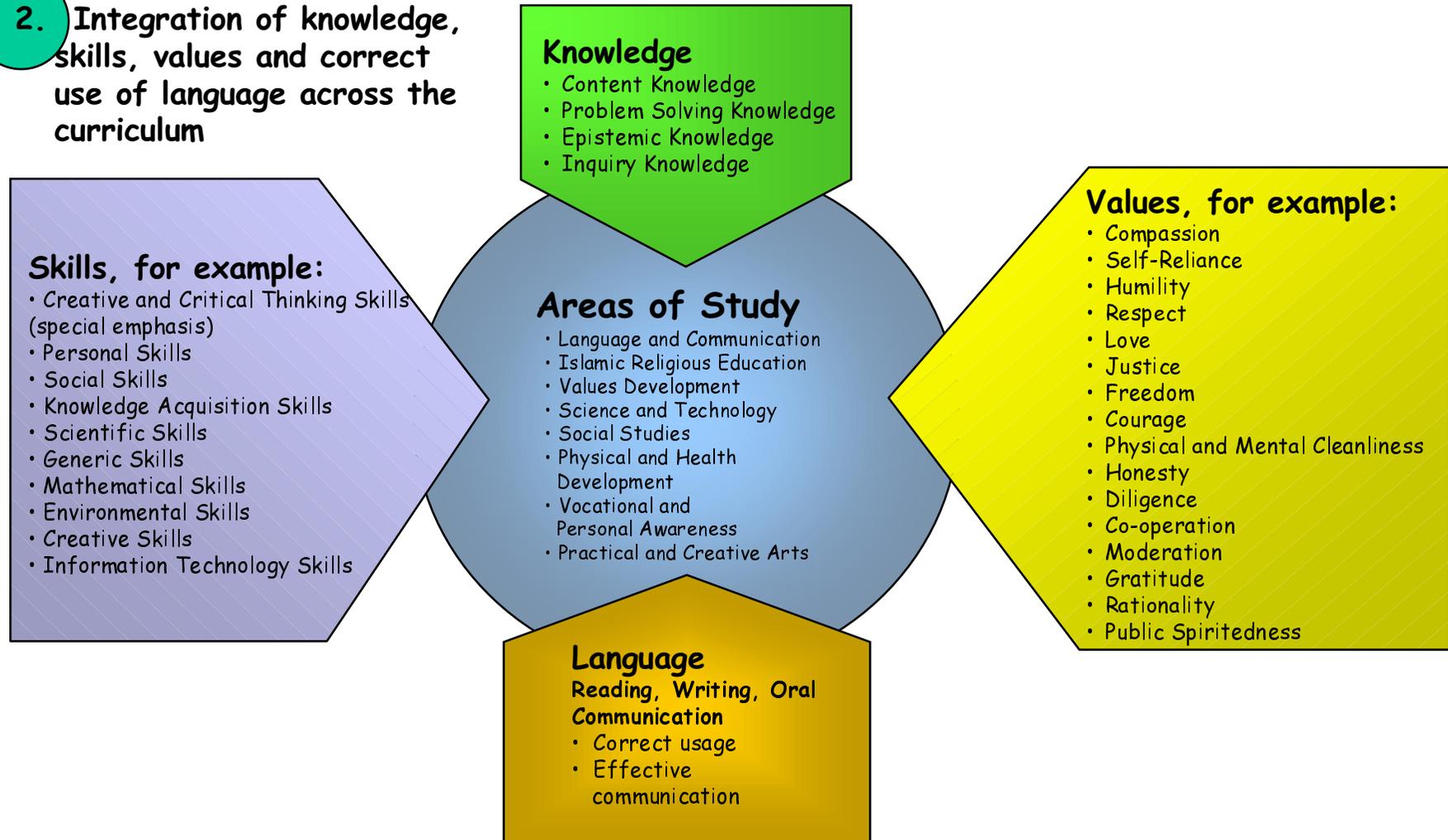
Instil moral and religious values. Emphasise adaptability, team-player characteristics, emotional balance and emotional intelligence.

### Physical/ Social

Instil social responsibility and consciousness of health and environmental issues. Emphasise a global orientation and inculcate work place skills and attitudes.

A wide variety of Skills, Knowledge, Language and Values elements in areas of study will form the new Curriculum for Smart Schools.

2. Integration of knowledge, skills, values and correct use of language across the curriculum



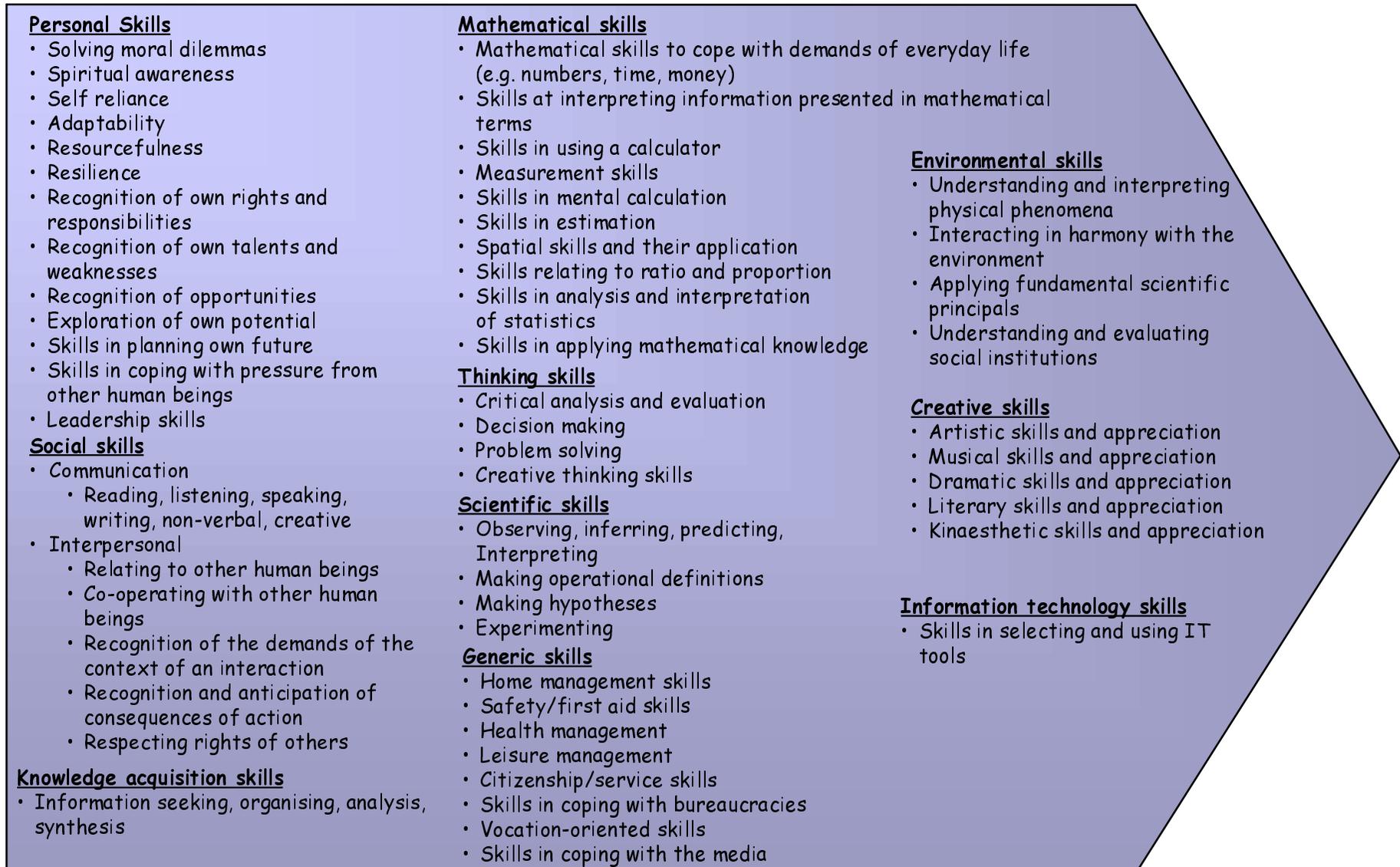
Elements of Knowledge that shall be infused into the Smart School curriculum in an integrated manner:

- **Content Knowledge (Facts, Concepts, Principles, and Generalisations)**  
Knowledge and know-how concerning the facts and routine procedures of a subject matter
  
- **Problem Solving Knowledge**  
Knowledge and know-how concerning the solution of characteristic problems in the subject matter
  
- **Epistemic Knowledge**  
Knowledge and know-how concerning justification and explanation in the subject matter
  
- **Inquiry Knowledge**  
Knowledge and know-how concerning the way results are challenged and new knowledge constructed in the subject matter

Examples of Values that shall be infused into the Smart School curriculum in an integrated manner:

<p><b><u>Compassion</u></b> sympathetic considerate generous understanding forgiving</p> <p><b><u>Self-Reliance</u></b> responsible able to act independently self-motivated self-confident</p> <p><b><u>Respect</u></b> show filial piety respect elders, teachers, friends, neighbours and leaders respect the king and country respect the basic rights of others respect the beliefs and customs of the different communities respect the uniqueness of the person abide by the law observe punctuality show appreciation for knowledge, experience and contribution show appreciation for labour respect the pride of others</p>	<p><b><u>Love</u></b> love for the environment love for the country love for peace and harmony</p> <p><b><u>Freedom</u></b> freedom as granted by the law freedom in the democratic system</p> <p><b><u>Courage</u></b> act wisely defend the truth stand firmly by one's own conviction accept responsibility</p> <p><b><u>Physical and Mental Cleanliness</u></b> cleanliness of the self cleanliness of the environment courteous conduct and speech the development of a healthy and constructive mind</p> <p><b><u>Co-operation</u></b> brotherhood shared responsibility co-operation tolerance common benefit unity</p> <p><b><u>Diligence</u></b> Steadfastness Effort Dedication Determination Perseverance</p>	<p><b><u>Moderation</u></b> moderation in feeling of self- importance and consideration for others moderation in speech and deed</p> <p><b><u>Gratitude</u></b> thankful thoughtful appreciative</p> <p><b><u>Rationality</u></b> prudence the ability to reason having open and logical minds courteous conduct and speech the development of a healthy and constructive mind</p> <p><b><u>Public Spiritedness</u></b> collaboration neighbourliness sensitivity to social issues</p> <p><b><u>Humility</u></b> courtesy readiness in admitting one's mistake friendliness</p> <p><b><u>Honesty</u></b> trustworthiness truthfulness sincerity</p> <p><b><u>Justice</u></b> fairness equity</p>
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Examples of Skills that shall be infused into the Smart School curriculum in an integrated manner:



**Personal Skills**

- Solving moral dilemmas
- Spiritual awareness
- Self reliance
- Adaptability
- Resourcefulness
- Resilience
- Recognition of own rights and responsibilities
- Recognition of own talents and weaknesses
- Recognition of opportunities
- Exploration of own potential
- Skills in planning own future
- Skills in coping with pressure from other human beings
- Leadership skills

**Social skills**

- Communication
  - Reading, listening, speaking, writing, non-verbal, creative
- Interpersonal
  - Relating to other human beings
  - Co-operating with other human beings
  - Recognition of the demands of the context of an interaction
  - Recognition and anticipation of consequences of action
  - Respecting rights of others

**Knowledge acquisition skills**

- Information seeking, organising, analysis, synthesis

**Mathematical skills**

- Mathematical skills to cope with demands of everyday life (e.g. numbers, time, money)
- Skills at interpreting information presented in mathematical terms
- Skills in using a calculator
- Measurement skills
- Skills in mental calculation
- Skills in estimation
- Spatial skills and their application
- Skills relating to ratio and proportion
- Skills in analysis and interpretation of statistics
- Skills in applying mathematical knowledge

**Thinking skills**

- Critical analysis and evaluation
- Decision making
- Problem solving
- Creative thinking skills

**Scientific skills**

- Observing, inferring, predicting, Interpreting
- Making operational definitions
- Making hypotheses
- Experimenting

**Generic skills**

- Home management skills
- Safety/first aid skills
- Health management
- Leisure management
- Citizenship/service skills
- Skills in coping with bureaucracies
- Vocation-oriented skills
- Skills in coping with the media

**Environmental skills**

- Understanding and interpreting physical phenomena
- Interacting in harmony with the environment
- Applying fundamental scientific principals
- Understanding and evaluating social institutions

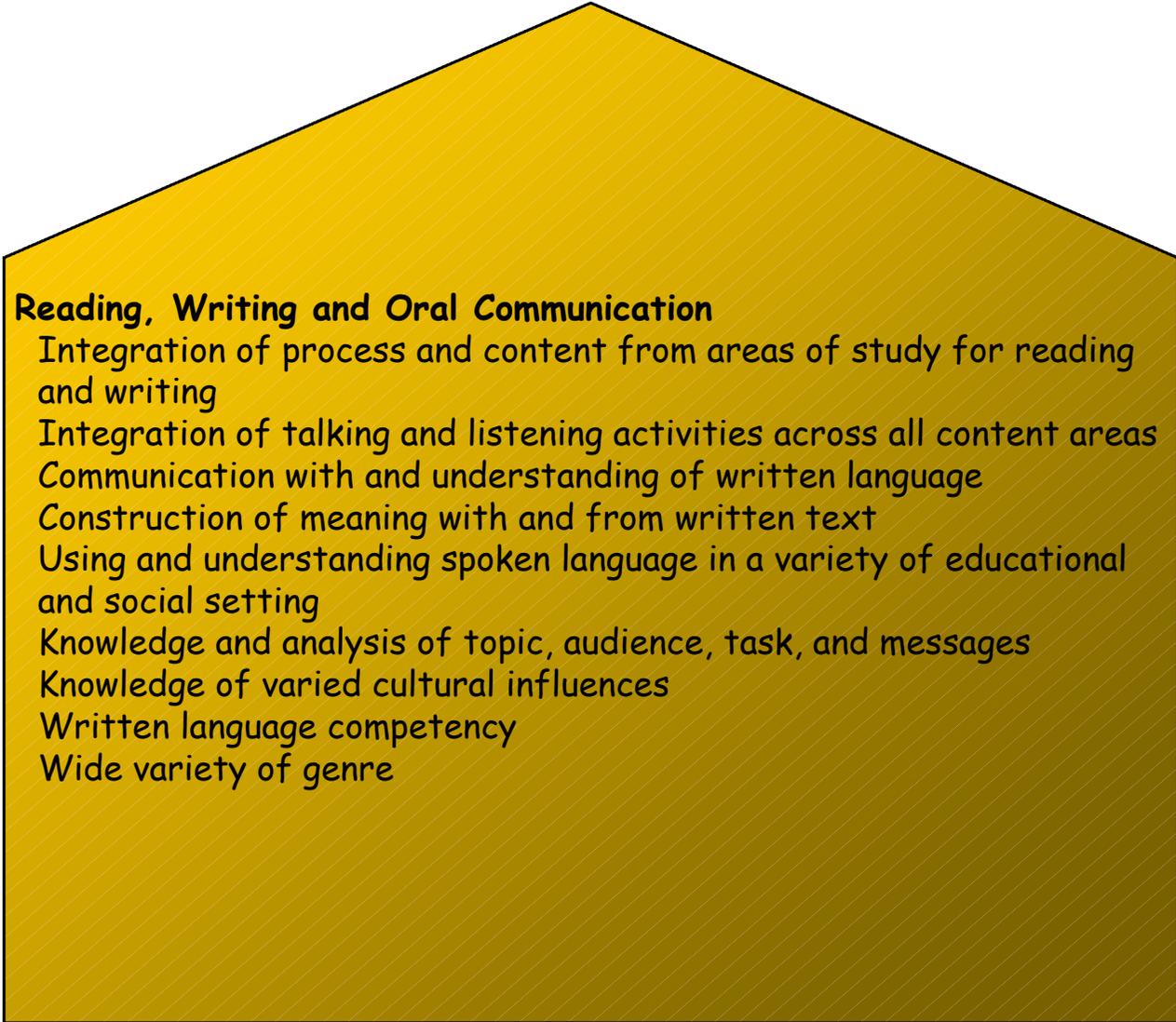
**Creative skills**

- Artistic skills and appreciation
- Musical skills and appreciation
- Dramatic skills and appreciation
- Literary skills and appreciation
- Kinaesthetic skills and appreciation

**Information technology skills**

- Skills in selecting and using IT tools

Elements of Language that shall be infused into the Smart School curriculum in an integrated manner:



**Reading, Writing and Oral Communication**

Integration of process and content from areas of study for reading and writing

Integration of talking and listening activities across all content areas

Communication with and understanding of written language

Construction of meaning with and from written text

Using and understanding spoken language in a variety of educational and social setting

Knowledge and analysis of topic, audience, task, and messages

Knowledge of varied cultural influences

Written language competency

Wide variety of genre

Curriculum Design for Smart Schools will incorporate elements of Vertical Integration:



**3. Intended learning outcomes explicitly stated for different levels of abilities, ensuring all students gain equal access to quality learning, and allowing for self-paced learning across grades.**  
**The curriculum will reflect vertical integration to allow high fliers to surf through their schooling years, without being kept apart from their peers, in virtual express classes.**



*Example*

**Each subject is divided into learning areas**

Example of a Learning Area in the English Language	
Intended Learning Outcomes	Suggested Resources, Techniques, Activities
<p><u>Level 1 (Mastery level)</u>                      Listen to selected texts and respond to Wh questions                      Retell a story viewed or read                      Read and describe events in narrative</p> <p><u>Level 2</u>                      Listen and respond to a variety of texts                      Talk about ideas, information and events in texts heard or read                      Read and respond to a variety of texts</p> <p><u>Level 3</u>                      Listen for cause-effect relationships                      Express personal views and comments constructively on others opinions and views                      Read a variety of texts and discuss ideas, information and events</p>	<p>Teach the use of signal words</p> <p>Listen to taped materials featuring two to three speakers</p> <p>Use completion exercises</p> <p>Encourage student participation in group activities to learn how to disagree politely</p> <p>Role playing</p> <p>Simulation exercises</p>

Curriculum Design for Smart Schools will also incorporate elements of Horizontal Integration:

- 4. The curriculum will reflect horizontal integration which features multidisciplinary and interdisciplinary approaches.

A multidisciplinary approach is one in which two or three subject areas are combined in a single learning area that focuses on a theme, issue, problem, topic, or concept.

An interdisciplinary approach combines all subject areas to focus the full array of disciplines on a theme, issue, problem, topic, or concept.

VERTICAL INTEGRATION

Grade levels

ALL SUBJECTS IN THE SCHOOL CURRICULUM

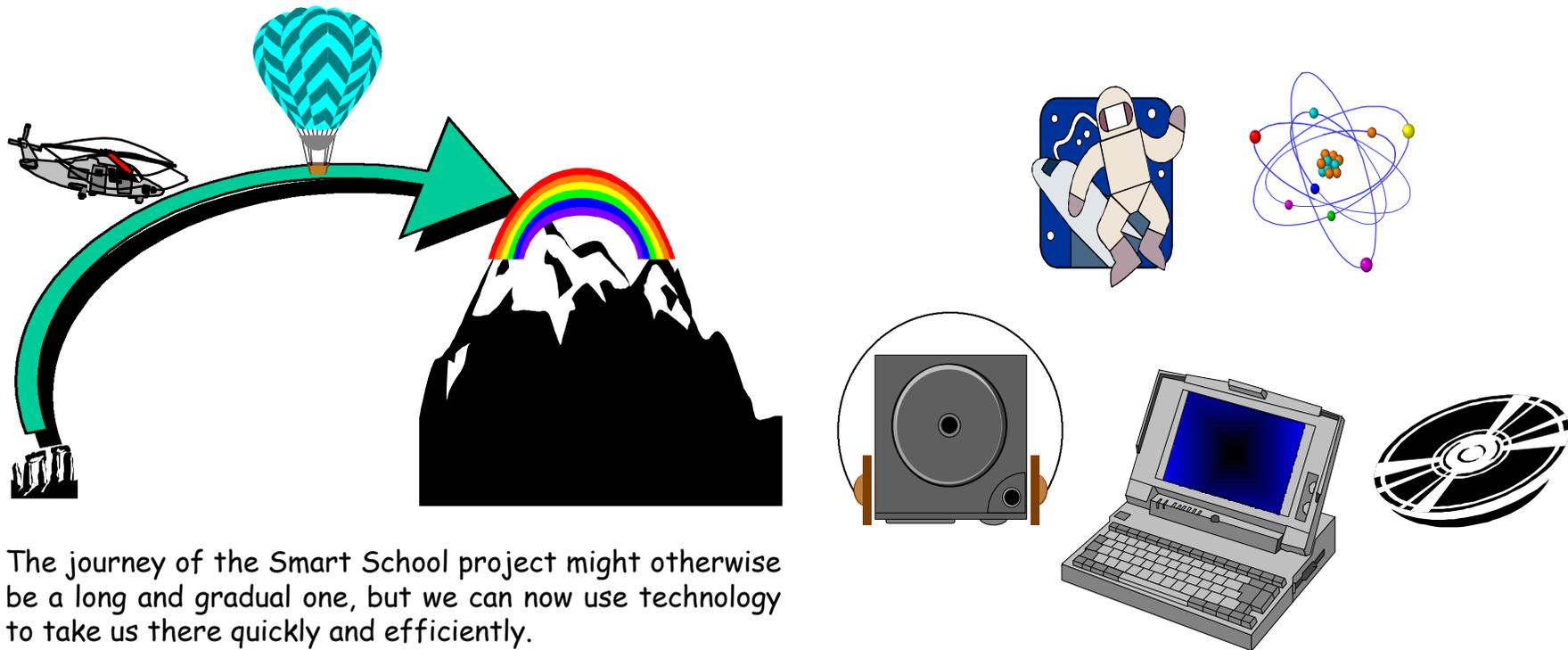

*Learning objectives for each year and each learning area listing knowledge, skills, values and attitudes in the form of intended learning outcomes*

HORIZONTAL INTEGRATION

IT literacy will be emphasised, to prepare students for the challenges of the Information Age:

5. Integration of knowledge, skills, values and attitudes suitable for the Information Age

IT Literacy is the ability to use IT tools and IT sources to:  
collect, analyse, process and present information  
support meaningful learning in a variety of contexts  
prepare for working life

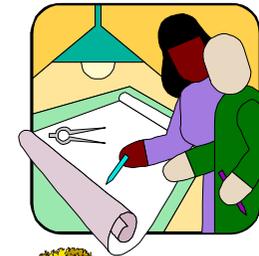


In addition, the Smart School co-curriculum programme will provide activities that reinforce classroom learning, as well as make schooling fun and interesting. Examples of such activities are:

Community service activities



Subject-related activities



Cultural activities



Social activities



Religious activities



Recreational activities



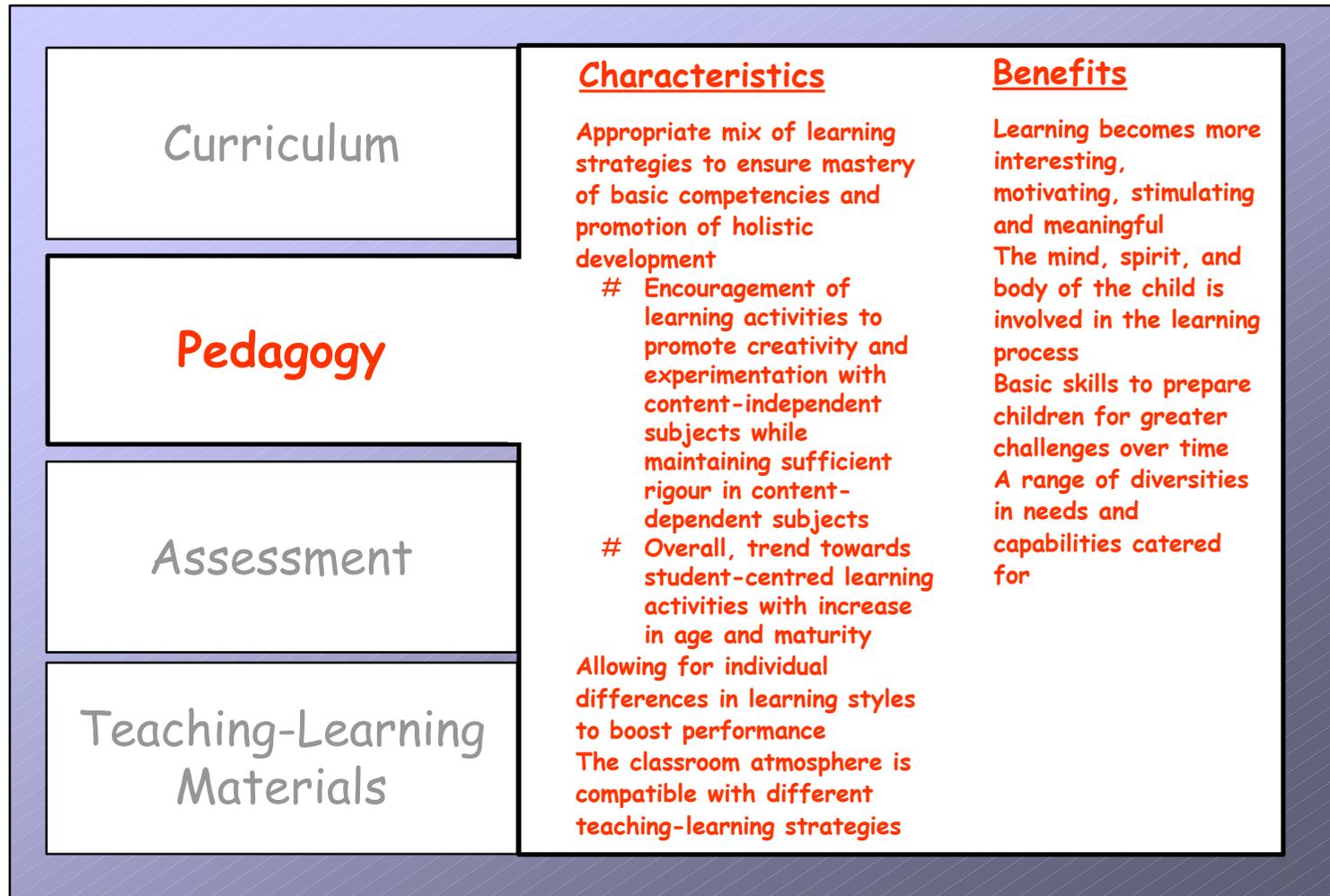
Uniformed body activities



Sports and games



Smart School pedagogy will be student-centred:



Different learning experiences will be experienced in Smart Schools, using innovative methods of teaching, for example:

<p><b>Process</b></p>	<p>involves specific learning goals active learning process, where learner constructs meaning continuous personalised</p>
<p><b>Modes</b></p>	<p>alone, in pairs, or in small teams with an expert (teacher or community member), a facilitator (teacher assistant, volunteer or student), non-human resources (hands-on materials, computer-based resources, multimedia resources, or print materials) at a site in the community, a computer-based multimedia simulation, a hands-on learning lab, a meeting room or library</p>
<p><b>Tasks</b></p>	<p>authentic, often in real life environments, with real world challenges interdisciplinary: * specific knowledge * general skills such as transfer of information across settings, negotiation and interpersonal skills, decision making skills mastery of a task before progressing to next task periodic performance mastery assessment more responsibility to learner for directing and managing own learning</p>

In Smart Schools, there will be an appropriate mix of learning strategies to ensure mastery of basic competencies and promotion of holistic development

The possible roles of students and teachers in the classroom environment range from those completely teacher-centred to those entirely student-centred. These represent a spectrum of possibilities, but it is possible to define the alternatives across this spectrum. Outlined below are four basic choices across the spectrum:

		Teacher-Centred	Teacher As Mentor and Model	Teacher As Coach or Facilitator	Student-Centred
Differentiating Factors	Establishment of Learning Objectives	Established by Teacher	Established by Teacher	Established through discussion between student and teacher	Established by student with teacher's suggestions and input
	Determination of Instructional Tasks	Determined by Teacher	Suggested by teacher, open to discussion	Determined by student with teacher's suggestions and input	Determined by student with teacher's suggestions and input
	Selection of Resources for Tasks	Selected by Teacher	Suggested by teacher, open to discussion	Selected by student with teacher's suggestions and input	Selected by student with teacher's suggestions and input

Another important input to the classroom environment is the strategy used for the learning process.

Some learning strategies for use in the classroom include:

<b><i>Learning Strategy</i></b>	<b><i>Description</i></b>
<b>Directive Strategies</b>	<ul style="list-style-type: none"> <li>• Drill, practice, mastery learning, and direct instruction</li> </ul>
<b>Observation Strategies</b>	<ul style="list-style-type: none"> <li>• Learning by observing others performing a function or task</li> </ul>
<b>Mediative Strategies</b>	<ul style="list-style-type: none"> <li>• Direct assisting of students in learning how to apply knowledge to solve problems</li> <li>• A combination of reasoning, coaching, and open-ended discussions</li> </ul>
<b>Generative Strategies</b>	<ul style="list-style-type: none"> <li>• Help students learn how to behave in appropriate situations and use their different intelligences</li> <li>• Includes tools like brainstorming, synectics, lateral thinking, and creativity by design</li> </ul>
<b>Collaborative Strategies</b>	<ul style="list-style-type: none"> <li>• Help students use interpersonal skills to accomplish tasks</li> </ul>
<b>Outside-Context Learning Strategies</b>	<ul style="list-style-type: none"> <li>• Activity-based learning, hands-on sessions, seminars, workshops, and do-it-yourself programmes</li> </ul>
<b>Metacognitive Learning Strategies</b>	<ul style="list-style-type: none"> <li>• Students learn through thinking about the learning process and how they did and how they can improve</li> </ul>

**Classroom Environments Compatible with Different Teaching Strategies**

Combining the roles within the classroom with the learning strategies available results in an overview of the different classroom environments. Some possible classroom environments are more realistic than others based on the fit between the roles of the teacher and student and the learning strategy.

	Teacher-Centred	Teacher as Mentor and Model	Teacher as Coach or Facilitator	Student-Centred
<b>Directive Strategies</b>	Focus on basic skills Frequent Drill and Repeat exercises			
<b>Observational Strategies</b>	Example of application of basic skills and theory Students observe expert or teacher	Teacher or expert shows class a concept Students ask questions in interactive session	Teacher or expert shows class a concept Students ask questions in interactive session	Teacher or expert shows a concept Students ask questions in interactive session Students are examples to each other
<b>Mediative Strategies</b>	Clear lesson plan determined by teacher Focus on applying basic skills, with some student-student interaction	Discussion and Question-and-Answer with students Learning goals set by teacher	Discussion and Question-and-Answer with students Learning goals set by teacher in discussion with students	
<b>Generative Strategies</b>		Teacher sets problem or assignment Students provided with options for appropriate solutions Teacher assists execution	Students and teachers jointly set goals Students expected to develop problem-solving options Teachers assists execution	Students set priorities with teacher input Students expected to set range of options for solving problems with teacher's help
<b>Collaborative Strategies</b>		Teacher sets learning objectives and rules Students are grouped, and teacher may also set the roles	Joint setting of learning goals Students expected to form groups and internally determine roles Teacher can intervene to guide or suggest	Students set learning objectives Students are grouped, may also set own roles Teachers can support students to find a co-operative working style
<b>Outside-Context Learning Strategies</b>		Teacher provides students with goals, options for execution Field activities and labs arranged by teacher	Joint goal setting between students and teachers Students expected to take initiative in selecting field exercises and lab options	Students develop problems and solutions jointly with teacher Field activities and labs arranged by students
<b>Metacognitive Learning Strategies</b>		Students are asked to discuss how they met goals in an assignment Use of simulated recall in classroom	Teacher should prompt students to reflect upon goals and activities	Students expected to reflect on own learning programmes and hold dialogues with teachers

 Poor Fit

**Incorporating High Level Thinking Skills and Values in the Classroom**

Most values and thinking skills can be taught in a variety of subjects, from an early age. As students grow older and in subjects that allow for a greater variety for a classroom environments (not just teacher-centred, directive), advanced applications of values and skills should become part of the environment. Higher order thinking skills and greater emphasis on discussing and strengthening values should take place.

	Teacher-Centred	Teacher as Mentor and Model	Teacher as Coach or Facilitator	Student-Centred
Directive Strategies				
Observational Strategies				
Mediative Strategies				
Generative Strategies				
Collaborative Strategies				
Outside-Context Learning Strategies				
Metacognitive Learning Strategies				

Increasing student control  
 with increasing age and maturity

Poor Fit

Preserving Student Enthusiasm for Learning With Age

One of the goals of the Smart School programme is to give students a lifelong enthusiasm for learning. Anecdotal evidence suggests that students who are given more control over their education are more likely to have a continued interest. A more student-centred environment as age increases may help preserve enthusiasm. However, appropriate strategies will differ between content dependent and content independent subjects.

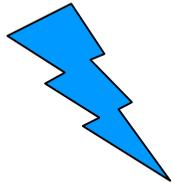
	Teacher-Centred	Teacher as Mentor and Model	Teacher as Coach and Facilitator	Student-Centred
Directive Strategies				
Observational Strategies				
Mediative Strategies				
Generative Strategies				
Collaborative Strategies				
Outside-Context Learning Strategies				
Metacognitive Learning Strategies				

**Content Dependent Subjects**  
 Teacher directs lessons to ensure mastery of skills  
 Students interact with teaching-learning materials for drills, practice and tutorials.

**Content Independent Subjects**  
 Students have greater control over content and direction of courses  
 Greater use of student-directed collaborative strategies

 Poor Fit

Another key factor in choosing classroom environments is the need to deal with diversity of skills, abilities, and enthusiasm levels in every group of students. A growing body of research suggests that many students have learning styles that are not catered for in traditional classroom environments.



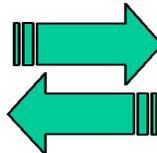
Highly-motivated students prefer to work by themselves to working in groups



Students often classified as at risk usually prefer to learn in small groups - something which is not often done in a traditional classroom.



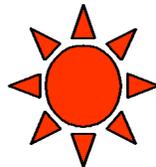
Some students appear to work faster and enjoy learning more when able to operate at their own pace



Some students prefer to move around while thinking about problems



Some students should be provided with additional materials that they can pursue without disturbing the class while others finish exercises



Some students find bright lights very distracting. Reducing lighting intensity can make concentration easier



Some students are able to operate in all three learning modalities: visual, auditory, and kinaesthetic



Some students prefer a less formal classroom environment



To accommodate diversity in students, teachers should make a point to include a variety of different types of lessons and learning experiences.

Making use of students learning styles can be helpful in managing diversity of motivation and ability in the classroom.

The classroom atmosphere will be important to support the Smart School teaching and learning model:

**Creating an atmosphere of respect and rapport**

positive teacher interaction with students  
positive student interaction

**Establishing a culture for learning**

importance of a balance between process and content in learning  
student pride in work  
high expectations for learning and achievement

**Managing classroom procedures**

collaborative management of instructional groups  
seamless management of transitions  
collaborative management of materials and supplies  
collaborative performance of non-instructional tasks  
effective supervision of volunteers and paraprofessionals

**Managing student behaviour**

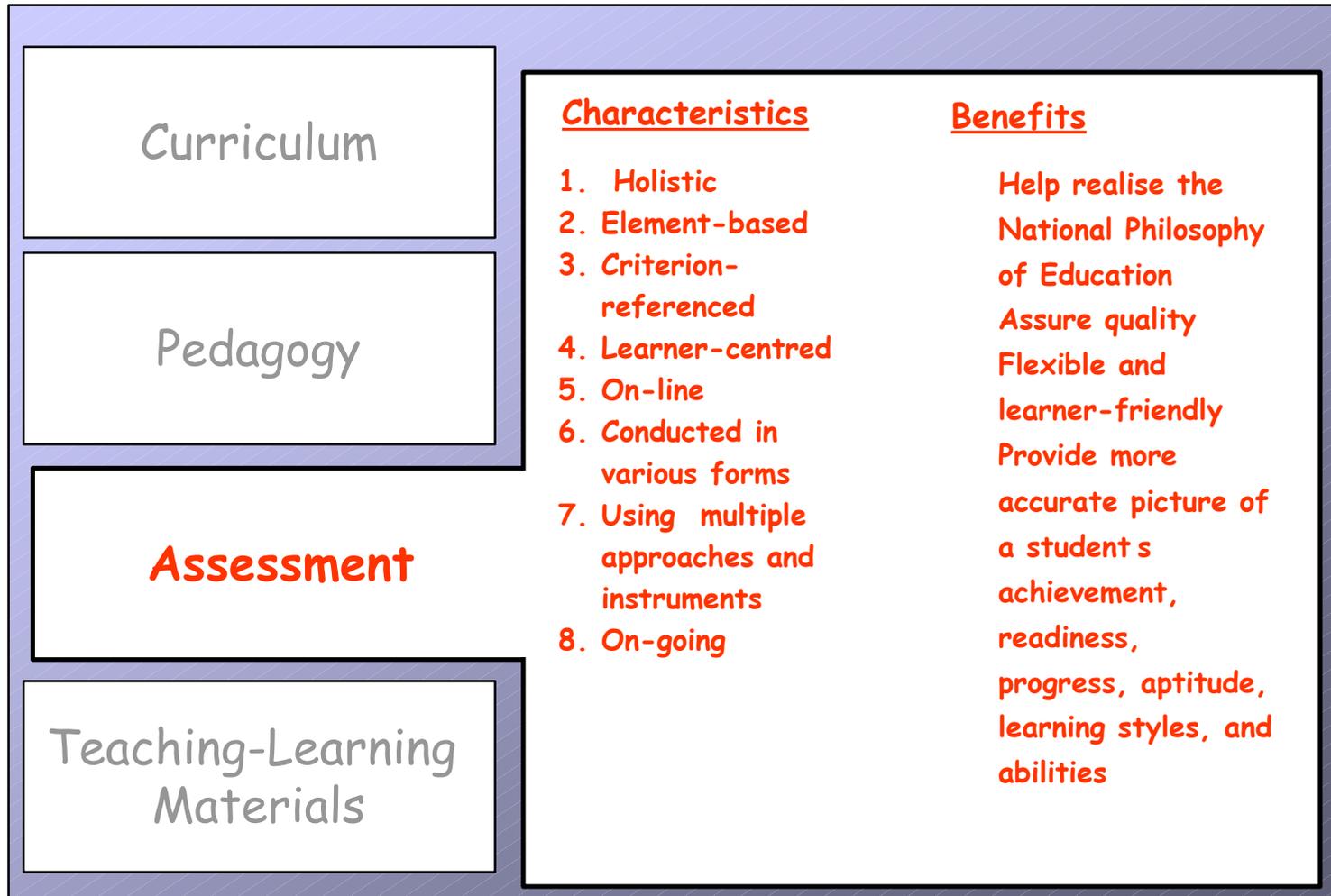
clear standards of conduct developed with students input  
unobtrusive monitoring of student behaviour by teacher and peers  
sensitive and appropriate response to student misbehaviour

**Organising physical space**

safe and optimal use of class space and furniture  
optimal use of all physical resources  
equal accessibility to all learning

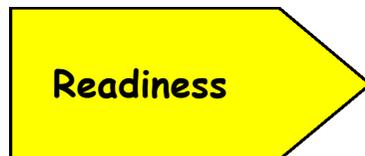


The Smart School assessment system will involve a significant departure from traditional assessment systems:



Firstly, the Smart School assessment system shall be holistic:

The scope of assessment in the Smart School is holistic in that it covers not only achievement but also readiness, progress and aptitude. Such an approach will give various information regarding the student s learning styles and abilities.



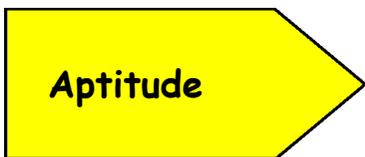
Learners have different experiences and their levels of entry in certain learning areas need to be assessed.



The student s progress in achieving certain learning objectives need to be monitored. His/Her strengths and weaknesses also need to be diagnosed.



Assessing the achievement of each intended learning outcome in a learning area is necessary to indicate whether the learner is ready to move on to the next area.

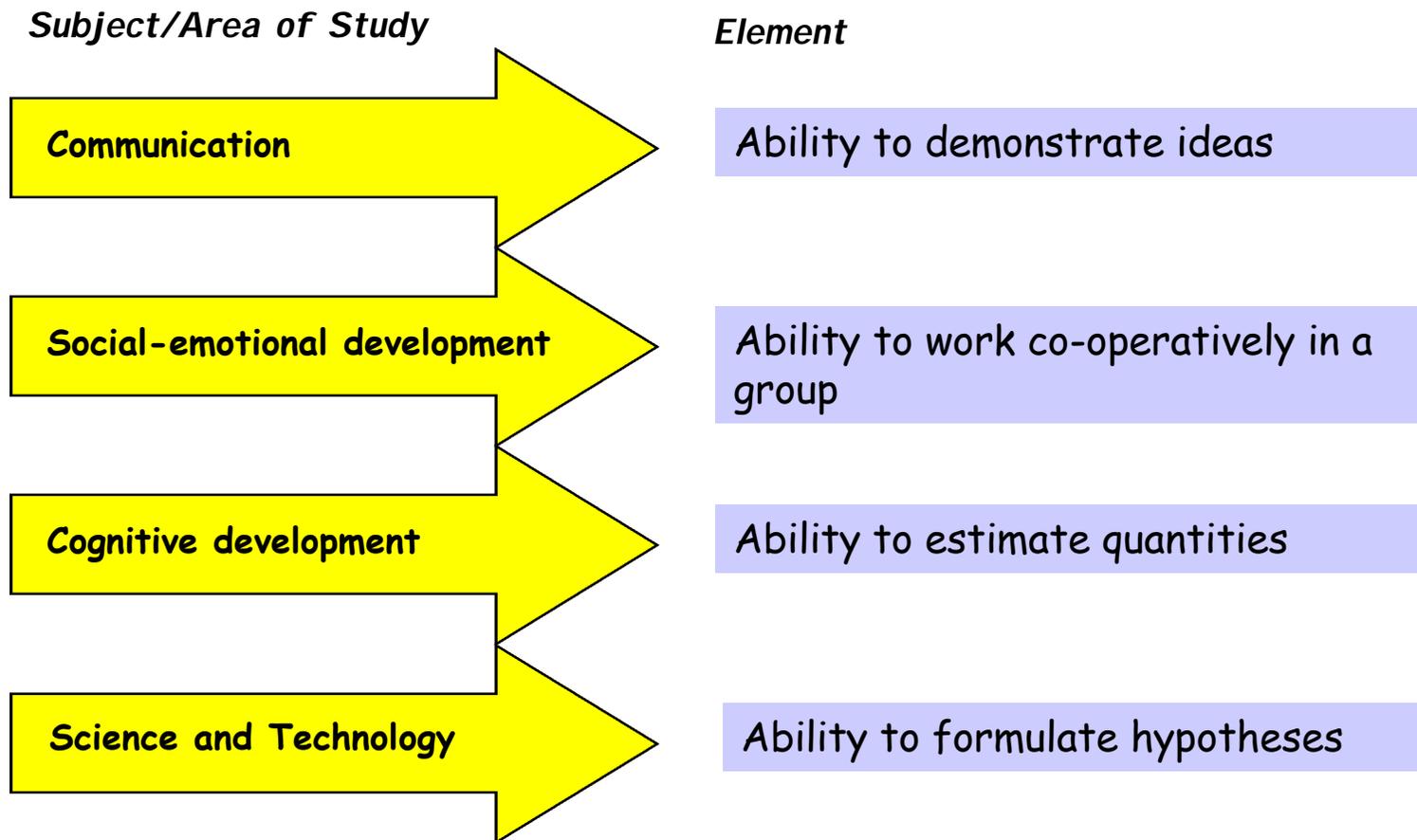


Learners different styles of learning and multiple intelligences have to be recognised.

**The assessment system shall also be element-based**

Element-based assessment focuses on the elements that students possess or must develop through the subjects in the school curriculum. This kind of assessment provides information on the mastery and achievement of elements by a student.

The following are examples of elements that may be developed through various subjects:



The Smart School assessment system shall be criterion-referenced:

**Criterion-referenced assessment is a form of assessment that evaluates an individual's performance based on a predetermined set of criteria.**

The identification of constructs which have to be developed and instilled in an individual provides the quantitative dimension. In order to operationalise our National Philosophy of Education, **educational standards** need to be established. Educational standards are statements pertaining to the minimum level of attainment to be achieved by an individual based on a predetermined set criteria and operationalised by a set of performance indicators.

**National criteria** are statements on the characteristics and levels of quality of elements that needs to be developed within an individual.

**National performance indicators** are statements on the type and features of evidence that can be observed while making judgements on the mastery of an element by an individual. Therefore assessment of the development of elements must be based on the set of criteria.



Assessment will also be learner-centred:

Learner-centred assessment is a flexible system of assessment which is administered on an individual basis.

All students will be assessed when they are ready. All assessment results will be recorded, and the reports done accordingly.



The assessment system will be on-line

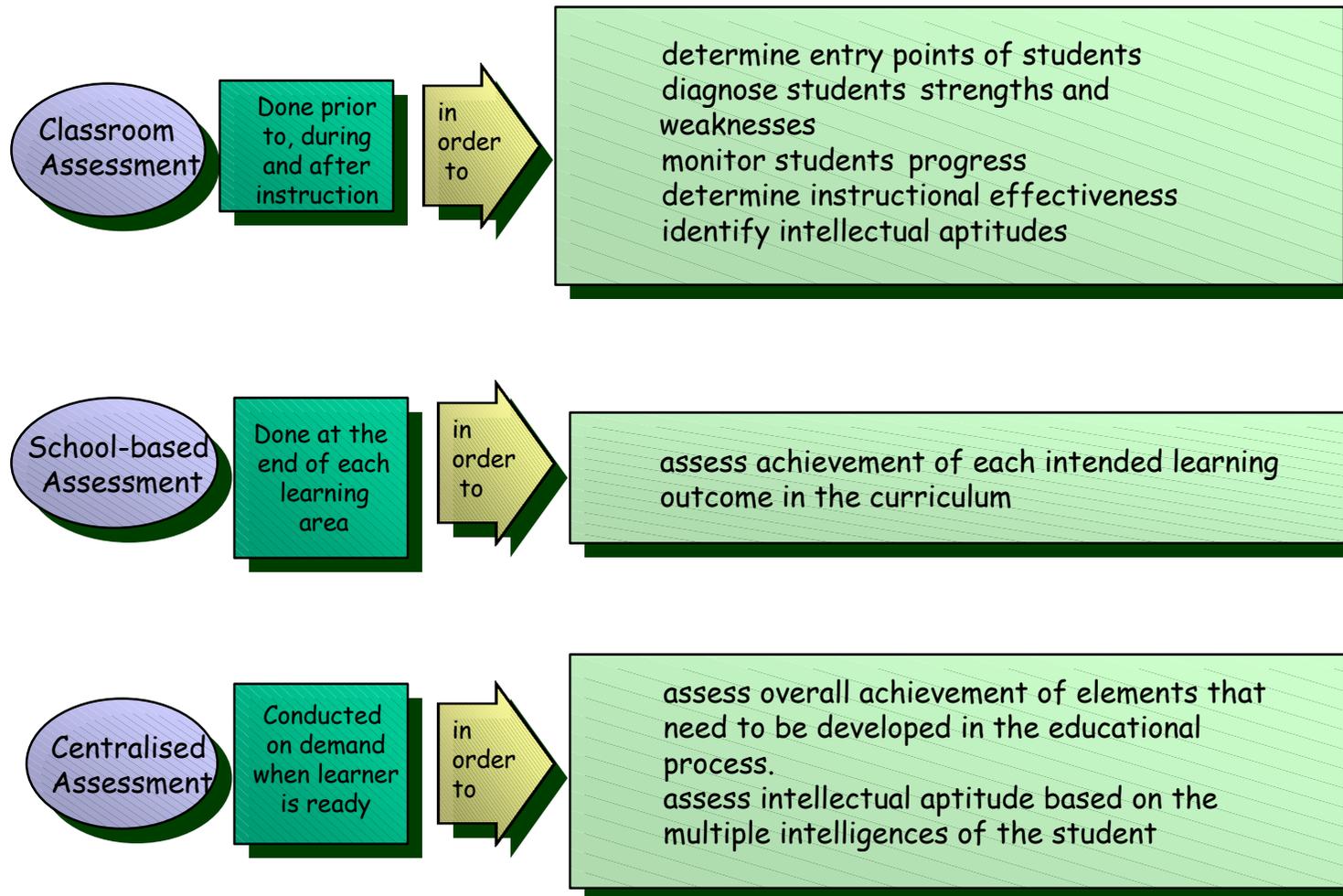
On-line assessment means that the items for smart assessment will be stored in a computerised item bank and be made available to users on terminals through networking.

The **integration of technology** as a tool to facilitate assessment will create a climate where assessment can be provided for each student virtually on demand.

With item banks and networking, teachers, students, assessment workers can engage in assessment activities whenever they are ready.



Assessment will be conducted in various forms: Classroom Assessment, School-based Assessment and Centralised Assessment, to allow different demonstrations of strengths, abilities and knowledge.



The Smart School assessment system will use multiple approaches and instruments to perform Authentic, Alternative and Performance Assessments:

Authentic, Alternative, and Performance Assessment actively involves students in a process that combines what is taught, how it is taught, and how it is evaluated



by means of

- Authentic, alternative and performance approach using the following instruments:
  - anecdotal records
  - calendar records
  - checklists
  - work samples
  - exhibitions

School Records



by means of

- Authentic, alternative and performance approach using the following instruments:
  - checklists
  - criterion-referenced tests
  - projects
  - work samples and exhibitions

Certification



by means of

- Criterion-referenced standardised tests
- Multiple Intelligences tests

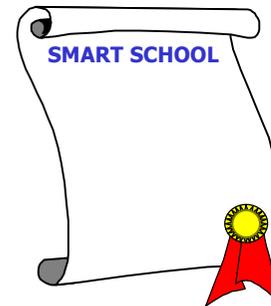
Smart school assessment will also be on-going and continuous:

Assessment is part of the teaching and learning process, and must therefore be on-going in nature. Hence, certification is a living process.

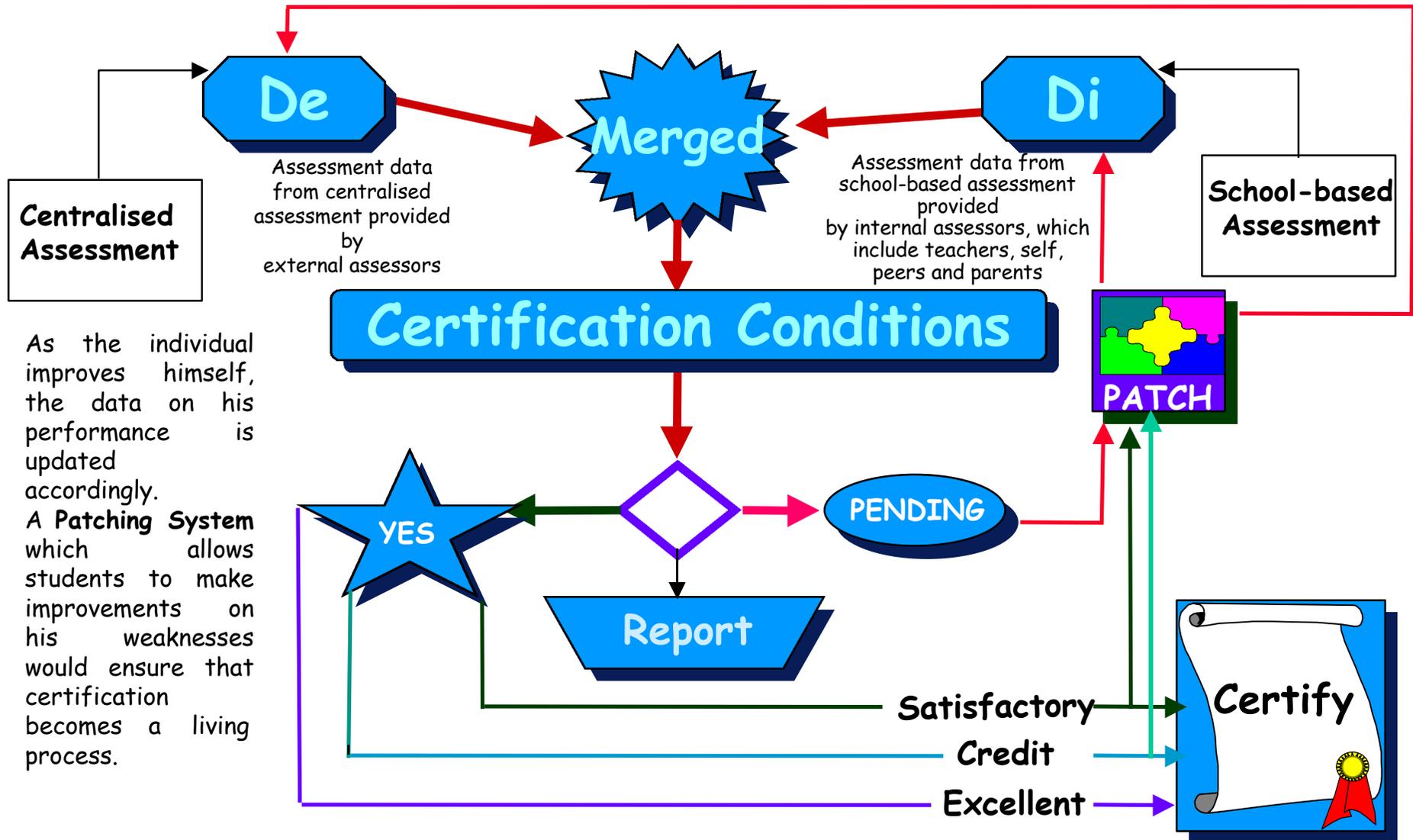
**Certification** is an important aspect of assessment. The certification process must be in harmony with the nature of assessment. To ensure that assessment is on-going, a living certification system will be introduced. Living certification is based on the belief that, given the opportunity, an individual can improve himself. Therefore certification, a record of students accomplishment, should be a living process whereby data on educational accomplishment is continuously gathered.

As the individual improves himself, data on his performance is updated accordingly. To realise this, a **Lifetime Database (LTDB)**, where each learner is identified by a Single ID must be established.

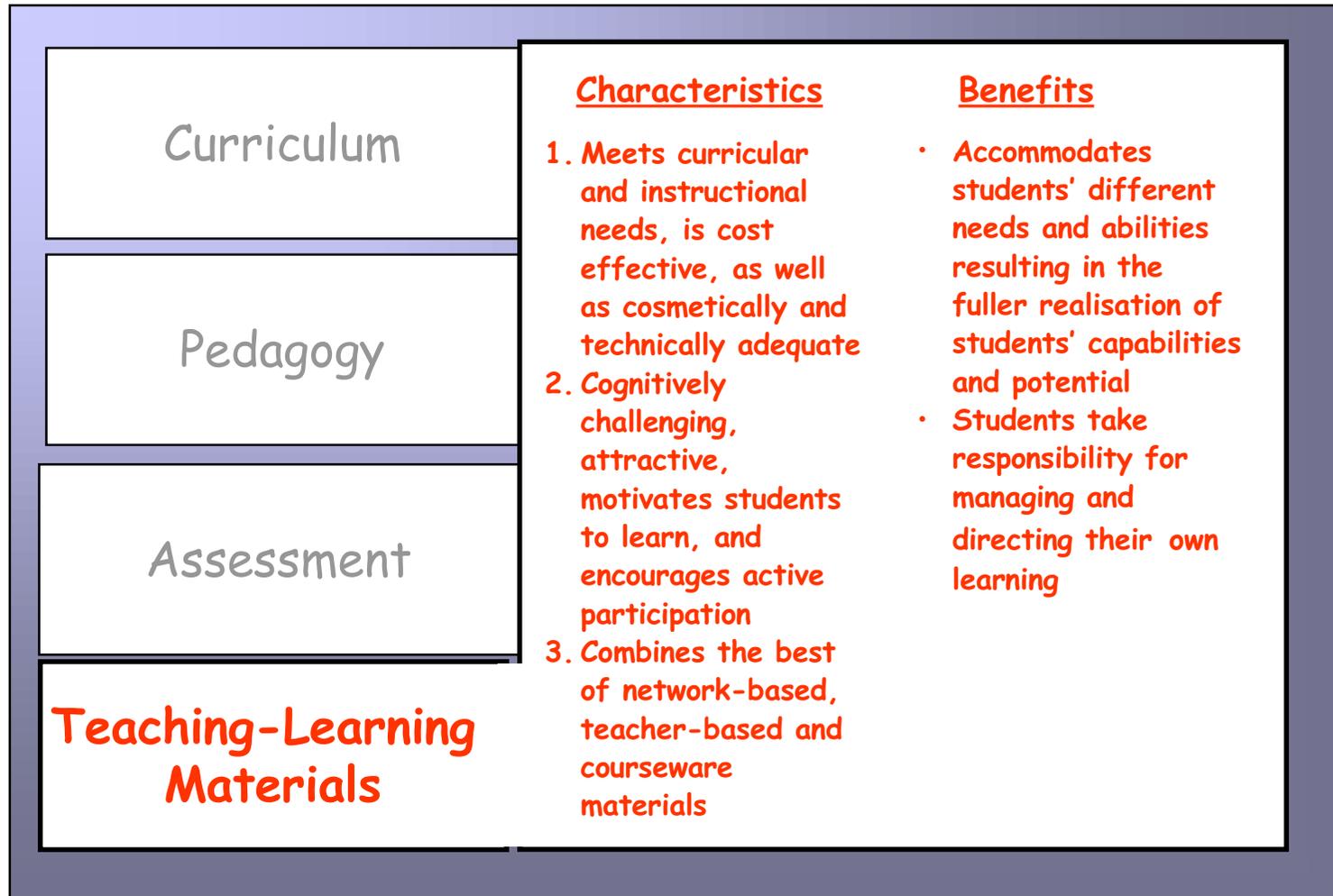
A **Patching System** which allows students to make improvements on his weaknesses would ensure that certification becomes a living process.



A living certification process will be employed for Smart Schools:

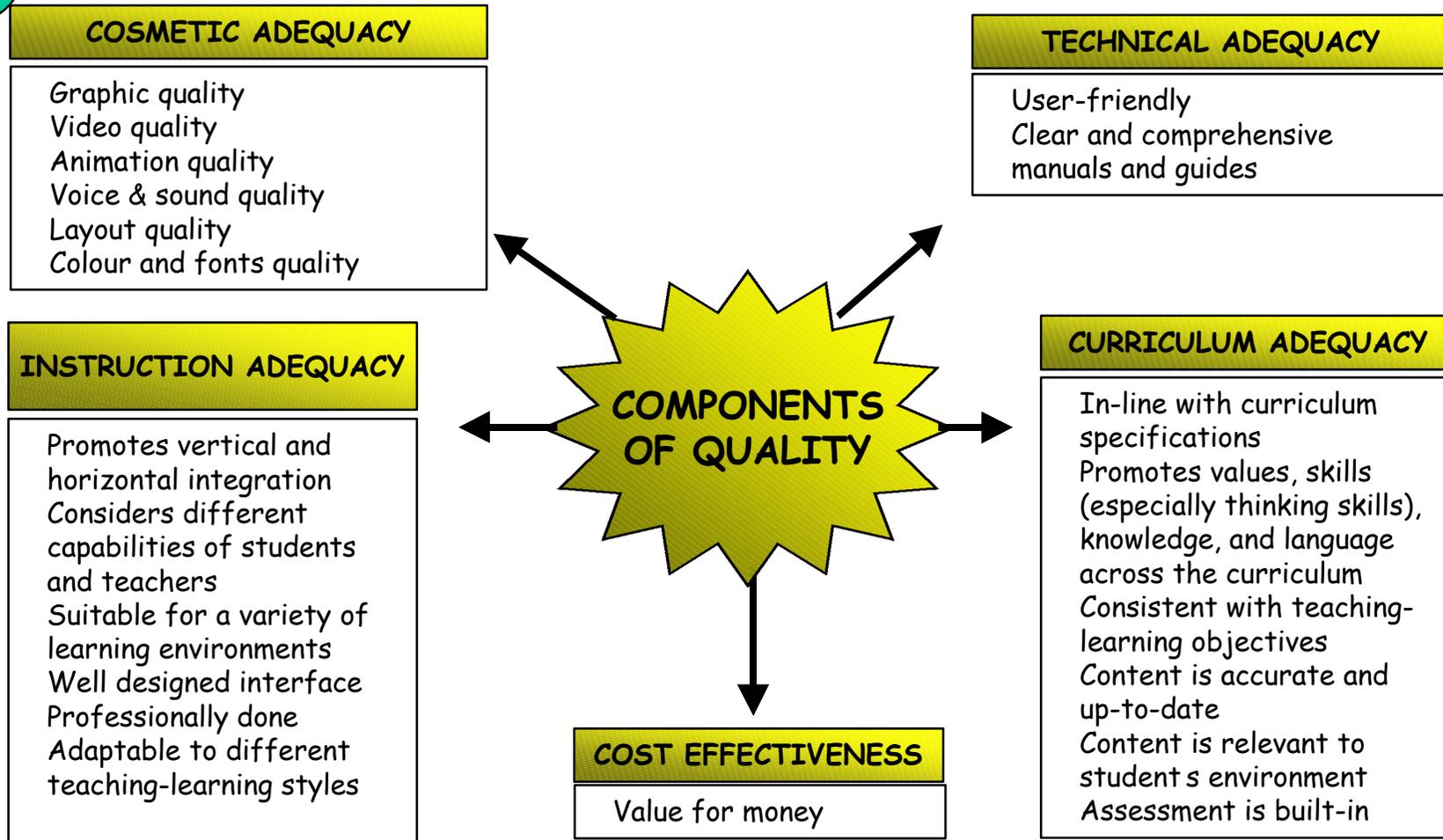


The Smart School Teaching-Learning Materials will be designed to fully support the new teaching-learning strategies for Smart Schools:

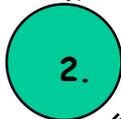


Conceptual selection and evaluation guidelines for teaching-learning materials will cover five main criteria:

- 1. Meets curricular and instructional needs, is cost effective, as well as cosmetically and technically adequate



Smart School teachers will be enabled, through the use of technology, to consider students individual learning preferences in designing and recommending instructional methods and materials:



2. Cognitively challenging, attractive, motivates students to learn, and encourages active participation

Example

**VERBAL/LINGUISTIC**

- Reading
- Vocabulary
- Formal Speech
- Journal/Diary Keeping
- Creative Writing
- Poetry
- Verbal Debate
- Impromptu Speaking
- Humour/Jokes
- Storytelling

**LOGICAL/MATHEMATICAL**

- Abstract Symbols/Formulas
- Outlining
- Graphic Organisers
- Number Sequences
- Calculation
- Deciphering Codes
- Forcing Relationships
- Syllogisms
- Problem-Solving
- Pattern Games

**VISUAL/SPATIAL**

- Visualisation
- Active Imagination
- Colour Schemes
- Patterns/Designs
- Painting
- Drawing
- Mind-mapping
- Pretending
- Sculpture
- Visual Pictures

**BODY/KINESTHETIC**

- Folk/Creative Dance
- Role Playing
- Physical Games
- Drama
- Martial Arts
- Body Language
- Physical Exercise
- Mime
- Inventing
- Sport games

**MUSICAL/RHYTHMIC**

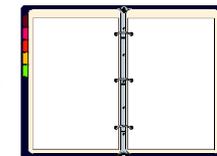
- Rhythmic Patterns
- Vocal Sounds/Tones
- Music Composition/Creation
- Percussion Vibrations
- Humming
- Environmental Sounds
- Singing
- Tonal Patterns
- Music Performance

**INTERPERSONAL**

- Giving Feedback
- Intuiting Others Feelings
- Co-operative Learning Strategies
- Person-to-Person Communication
- Empathy Practices
- Division of Labour
- Collaboration Skills
- Receiving Feedback
- Sensing Others Motives
- Group Projects

**INTRAPERSONAL**

- Meditation Methods
- Metacognition Techniques
- Thinking Strategies
- Emotional Processing
- Know Thyself Procedures
- Mindfulness Practices
- Focusing/Concentration Skills
- Higher-Order Reasoning
- Complex Guided Imagery
- Centring Practices



**SMART  
SCHOOL  
TOOLBOX**

Source: Armstrong, Thomas. (1994). *Multiple Intelligences in the Classroom*. Alexandria, Virginia, U.S.A.: Association for Supervision and Curriculum Development

because children have different learning styles, they will need a variety of materials to maximise their learning potential:

Example

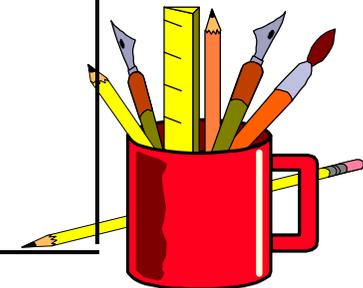
**Children Who Are Strongly**

	Think	Love	Need
<b>Linguistic</b>	in words	reading, writing, telling stories, playing word games.	books, tapes, writing tools, paper, diaries, dialogue, discussion, debate, stories.
<b>Logical-Mathematical</b>	by reasoning	experimenting, questioning, figuring out logical puzzles, calculating.	things to explore and think about, science materials, manipulatives, trips to the science museum.
<b>Spatial</b>	in images and pictures	designing, drawing, visualising, doodling.	art, building blocks, video, movies, slides, imagination games, mazes, puzzles, illustrated books.
<b>Bodily-Kinaesthetic</b>	through somatic sensations	dancing, running, jumping, building, touching, gesturing.	role play, drama, movement, things to build, sports and physical games, tactile experiences.
<b>Musical</b>	via rhythms and melodies	singing, whistling, humming, tapping feet and hands, listening..	sing-along sessions, trips to concerts, music playing, musical instruments.
<b>Interpersonal</b>	by bouncing ideas off other people	leading, organising, relating, manipulating, mediating.	friends, group games, social gatherings, community events, clubs.
<b>Intrapersonal</b>	deeply inside of themselves	setting goals, mediating, dreaming, being quiet, planning	time alone, self-paced projects, choices.

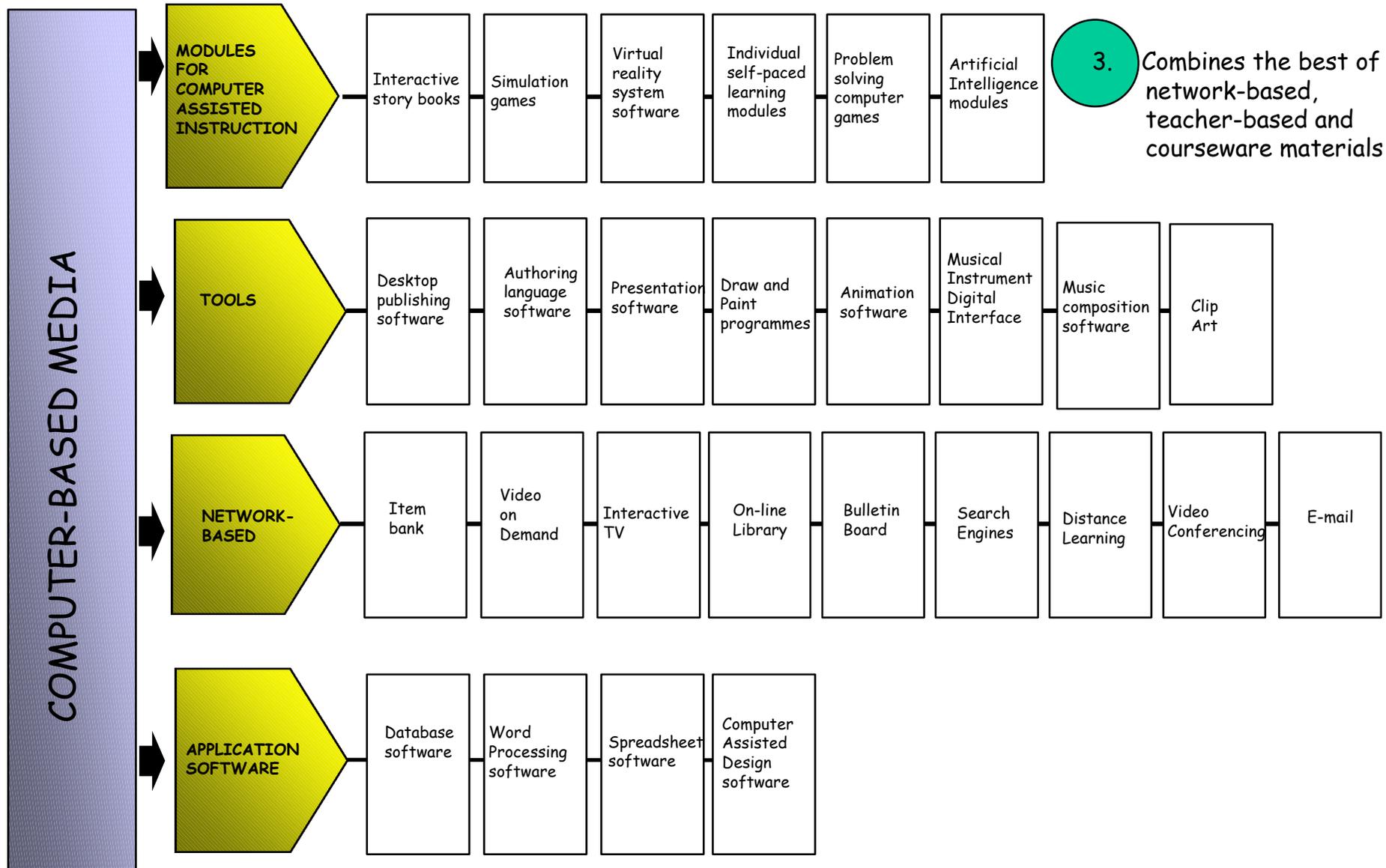
Source: Armstrong, Thomas. (1994). *Multiple Intelligences in the Classroom*. Alexandria, Virginia, U.S.A.: Association for Supervision and Curriculum Development

Conventional media, commonly used in today's educational settings, will still feature in Smart Schools. They can be divided into three main categories.

Printed (paper based)	3D Objects	Audio/Visual
<p>Examples:</p> <ul style="list-style-type: none"> <li>• Books</li> <li>• Encyclopaedias</li> <li>• Magazines</li> <li>• Newspapers</li> <li>• Documents</li> <li>• Flat Pictures</li> <li>• Drawings/Paintings</li> <li>• Maps</li> <li>• Graphs/Charts/ Diagrams</li> <li>• Posters</li> <li>• Cartoons/Comics</li> </ul>	<p>Examples:</p> <ul style="list-style-type: none"> <li>• Globes</li> <li>• Puppets</li> <li>• Models</li> <li>• Mock-ups</li> <li>• Collections</li> <li>• Specimens</li> </ul>	<p>Examples:</p> <ul style="list-style-type: none"> <li>• Slide-Tapes</li> <li>• Filmstrips</li> <li>• Radio Programmes</li> <li>• TV Programmes</li> <li>• Motion-picture films</li> <li>• Microfilms/ Microfiches</li> <li>• Audio Cards</li> <li>• Audio Tapes</li> </ul>



Conventional media will be used in an integrated manner with high-technology media, for example, computer-based teaching-learning materials...



and software that fulfil the various needs and capabilities of students

Example

**Linguistic Intelligence**

- Word processing programmes
- Typing tutors
- Desktop publishing programmes
- Electronic libraries
- Interactive storybooks
- Word Games



**Bodily-Kinaesthetic Intelligence**

- Hands-on construction kits that interface with computers
- Motion-simulation games
- Virtual-reality system software
- Eye-hand co-ordination games
- Tools that plug into computers



**Logical-Mathematical Intelligence**

- Mathematical skills tutorials
- Computer programming tutors
- Logic games
- Science programmes
- Critical thinking programmes



**Musical Intelligence**

- Music literature tutors
- Singing software (transforms voice input into synthesiser sounds)
- Composition software
- Tone recognition and melody memory enhancers
- Musical instrument digital interfaces (MIDI)



**Spatial Intelligence**

- Animation programmes
- Draw and Paint programmes
- Electronic chess games
- Spatial problem solving games
- Electronic puzzle kits
- Clip Art programmes
- Geometry programmes
- Graphic presentations of knowledge



**Interpersonal Intelligence**

- Electronic bulletin boards
- Simulation games



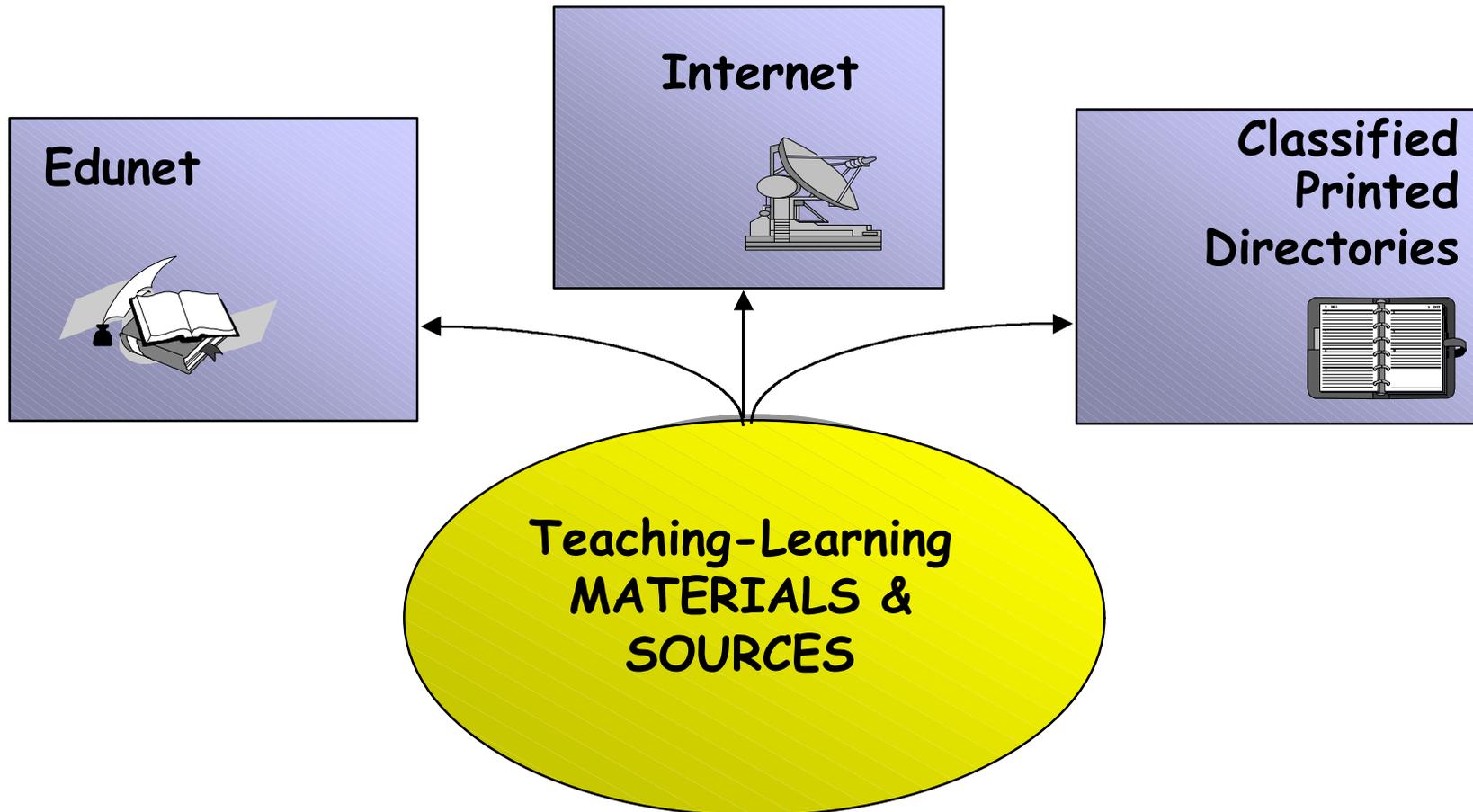
**Intrapersonal Intelligence**

- Personal choice software
- Career counselling software
- Any self-paced programme



Source: Armstrong, Thomas. (1994). *Multiple Intelligences in the Classroom*. Alexandria, Virginia, U.S.A.: Association for Supervision and Curriculum Development

Teaching-learning materials will be acquired from a wide range of sources, and will no longer be limited by resources within schools. In addition to libraries, businesses, homes, government departments, other sources include:

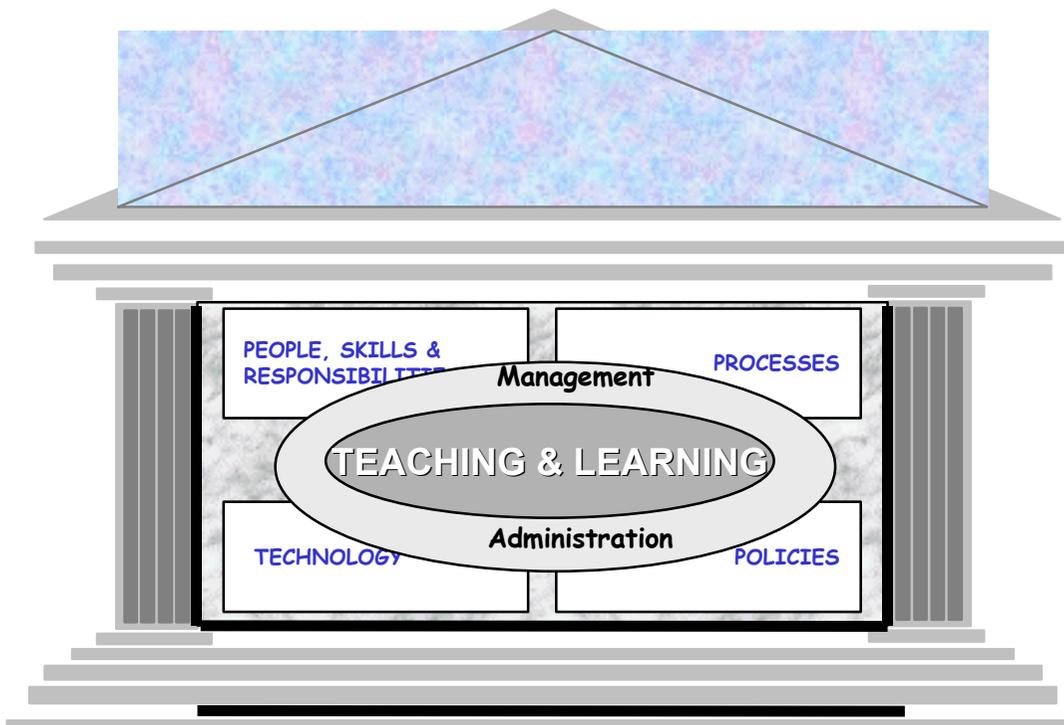


# The Malaysian Smart School

# Smart School Management

**Smart School Management**

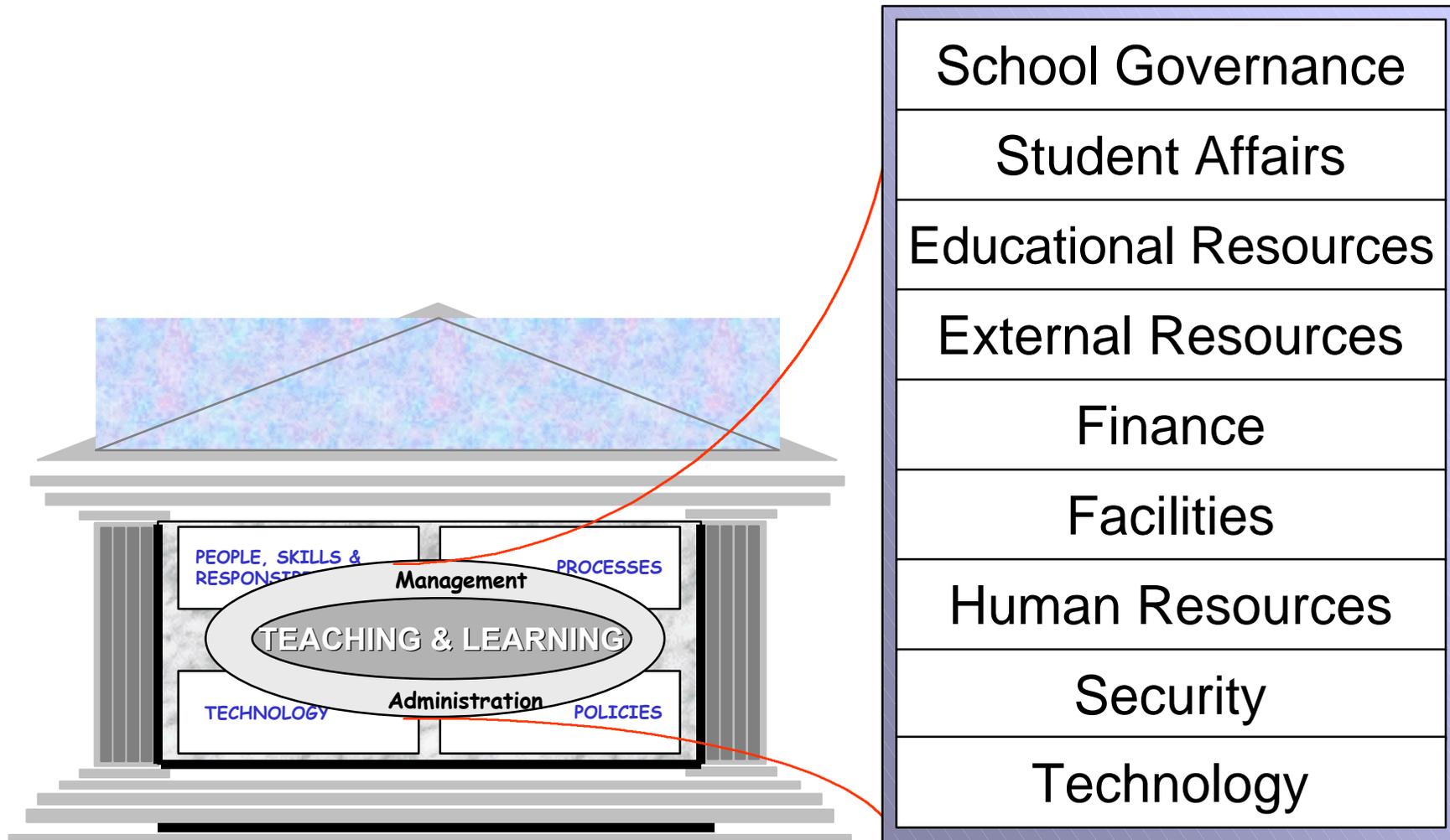
This Section provides a high-level description of Smart School Management. The objectives of Smart School Management are to efficiently and effectively manage the resources and processes required to support the Teaching and Learning functions of the school.



**How to read this Section**

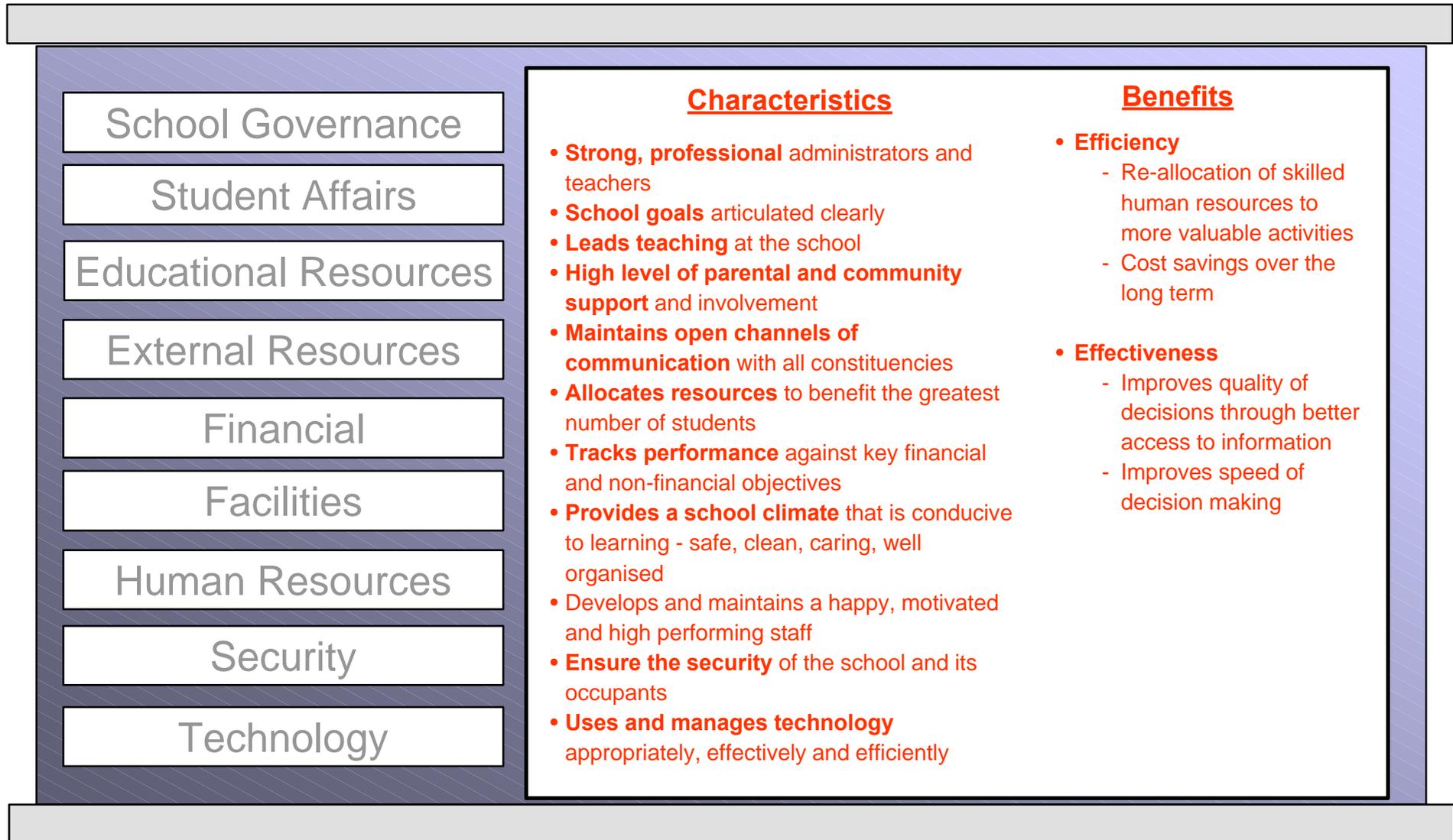
The Section begins with a description of the key characteristics of Smart School Management. Smart School Management functions are categorised into nine broad areas and each of these functions are also described in further detail.

The functional elements of the Smart School Management System is divided into nine primary areas:



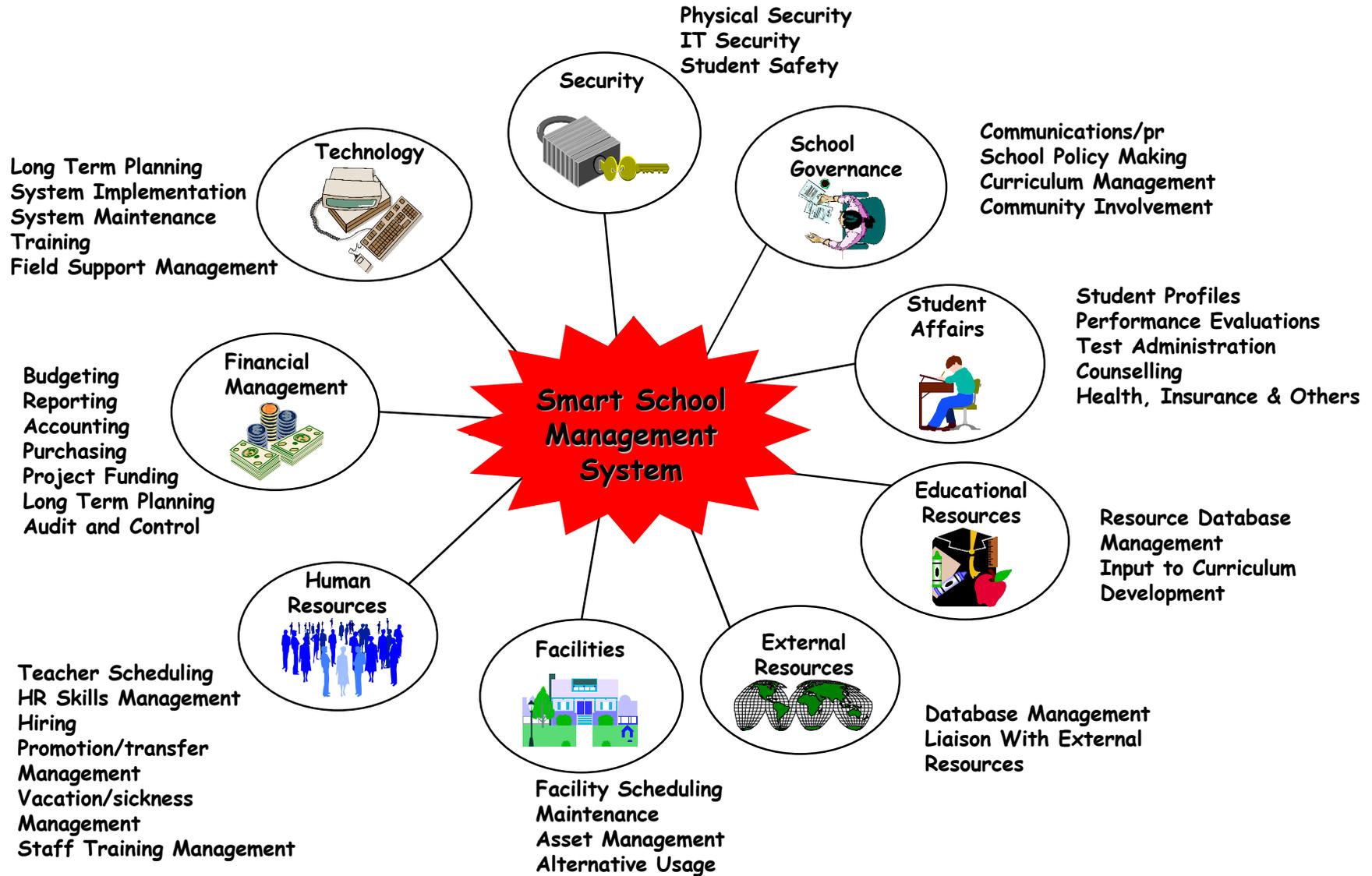
**Primary objective of Smart School Management :**

To efficiently and effectively manage the resources and processes required to support the teaching and learning functions within Smart Schools:

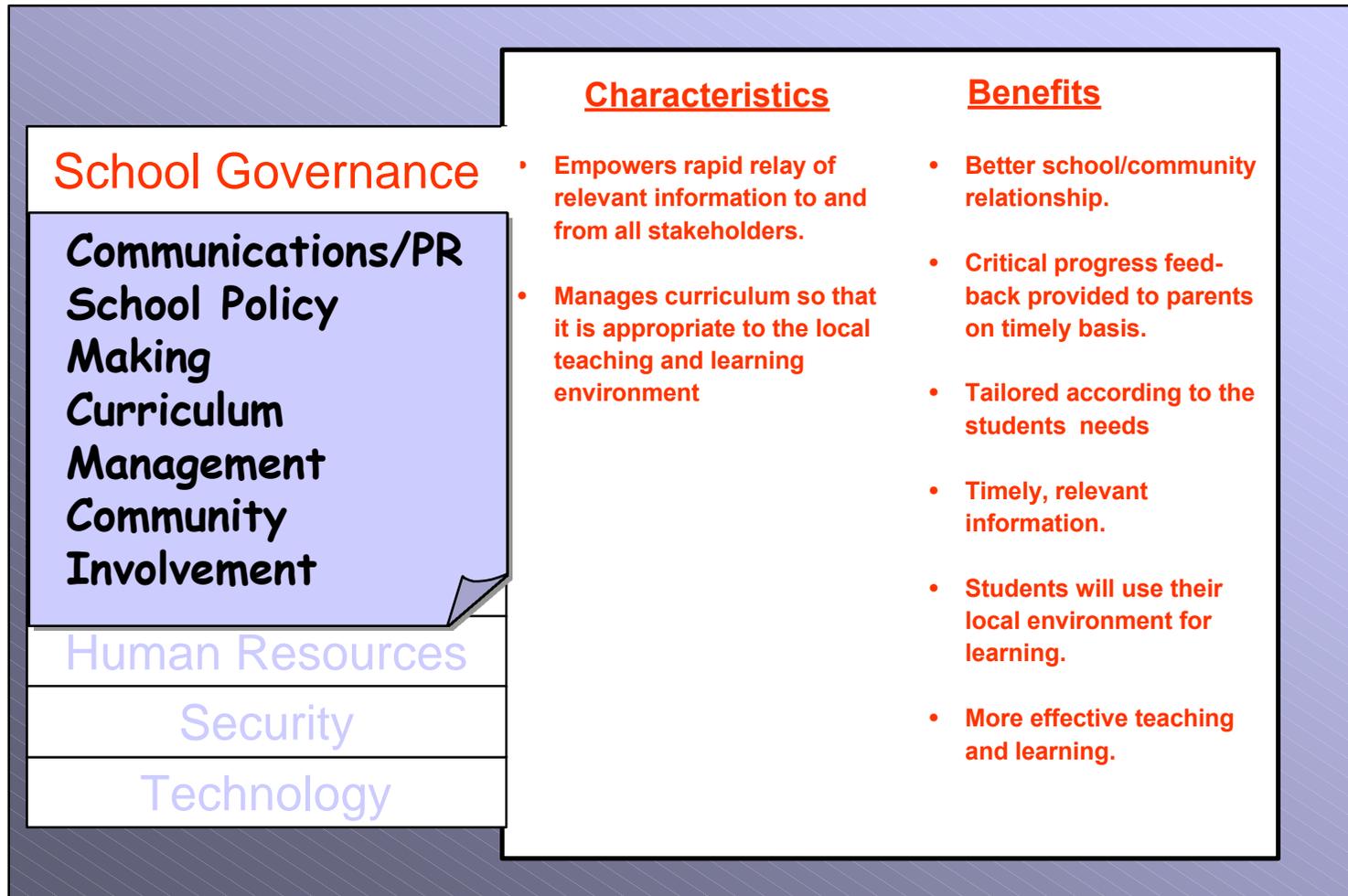


Smart School management functional areas

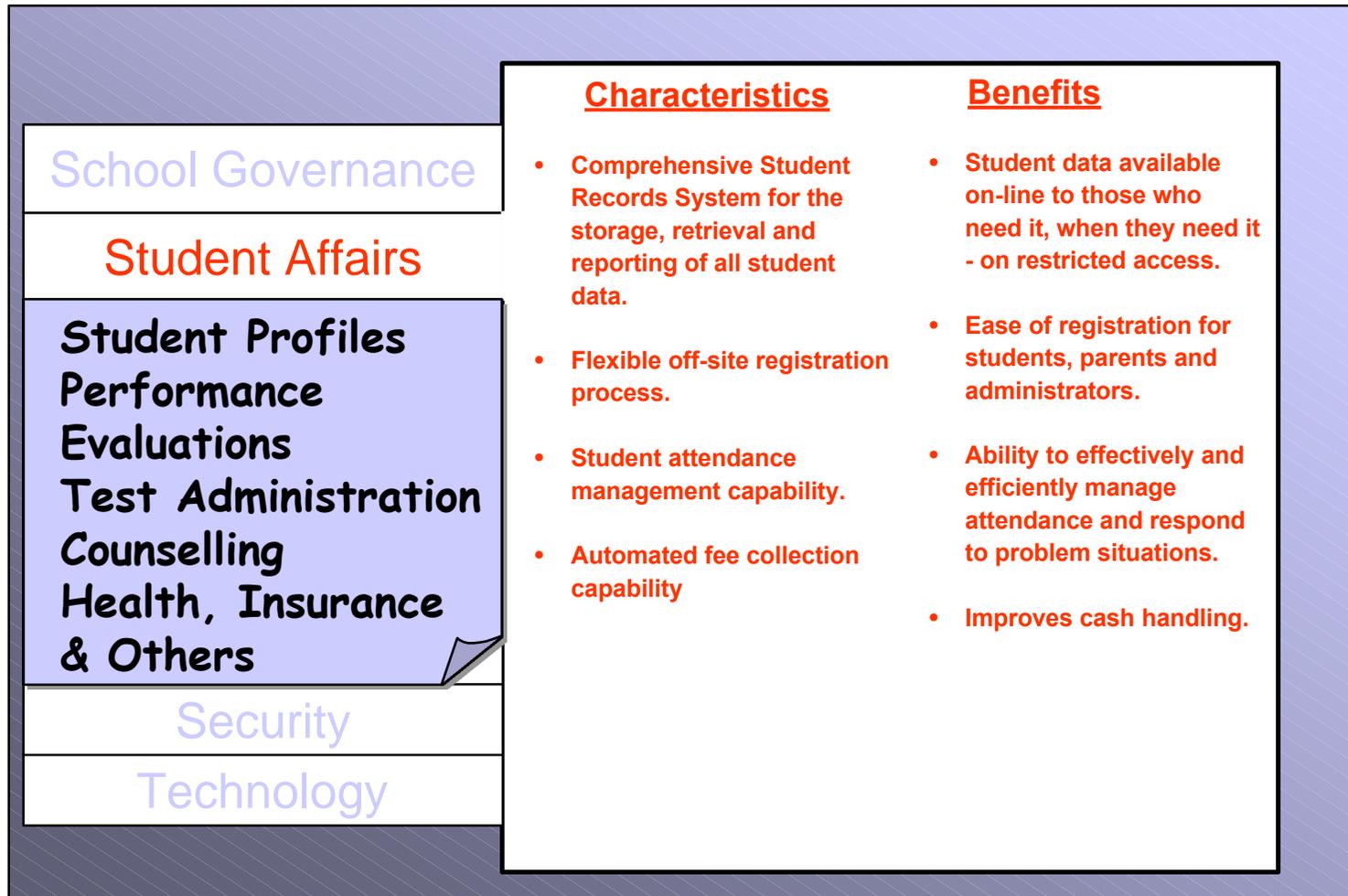
The Nine Primary Functions of Smart School Management :



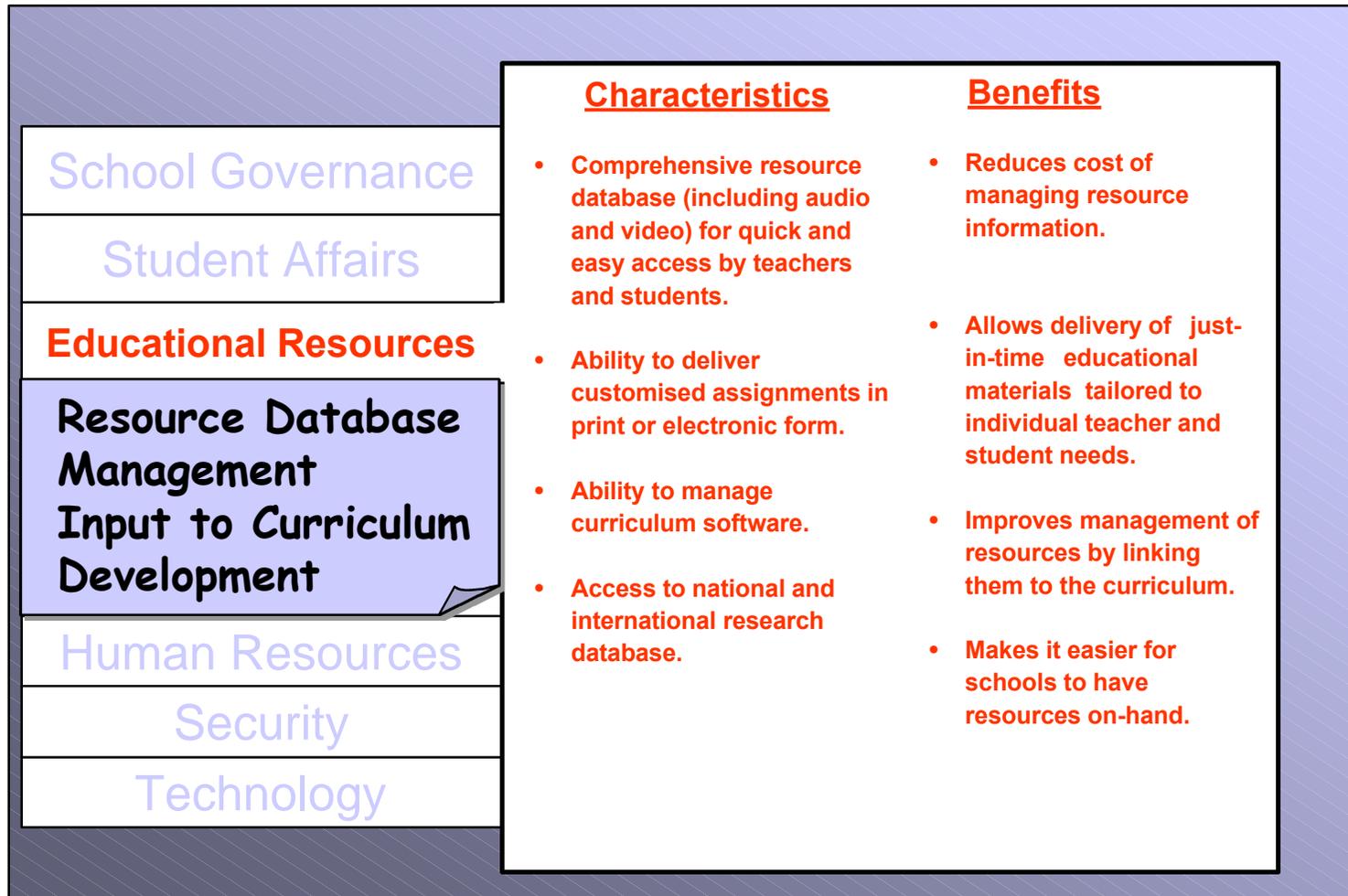
The School Governance component will be primarily concerned with the day-to-day management of school-wide policies and operations:



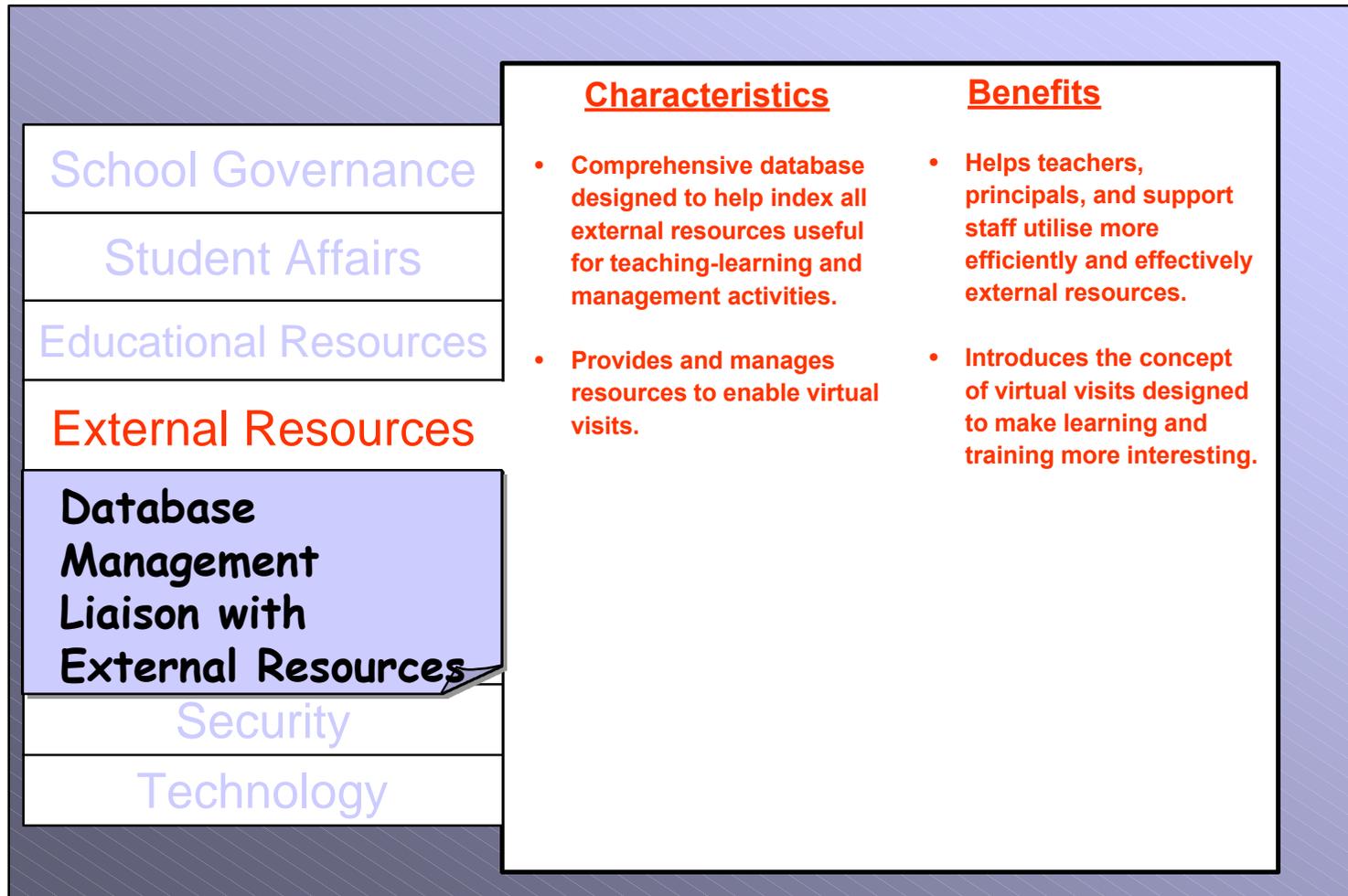
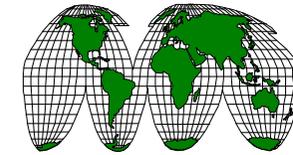
The Student Affairs component will be concerned with managing student records and all other matters pertaining to students:



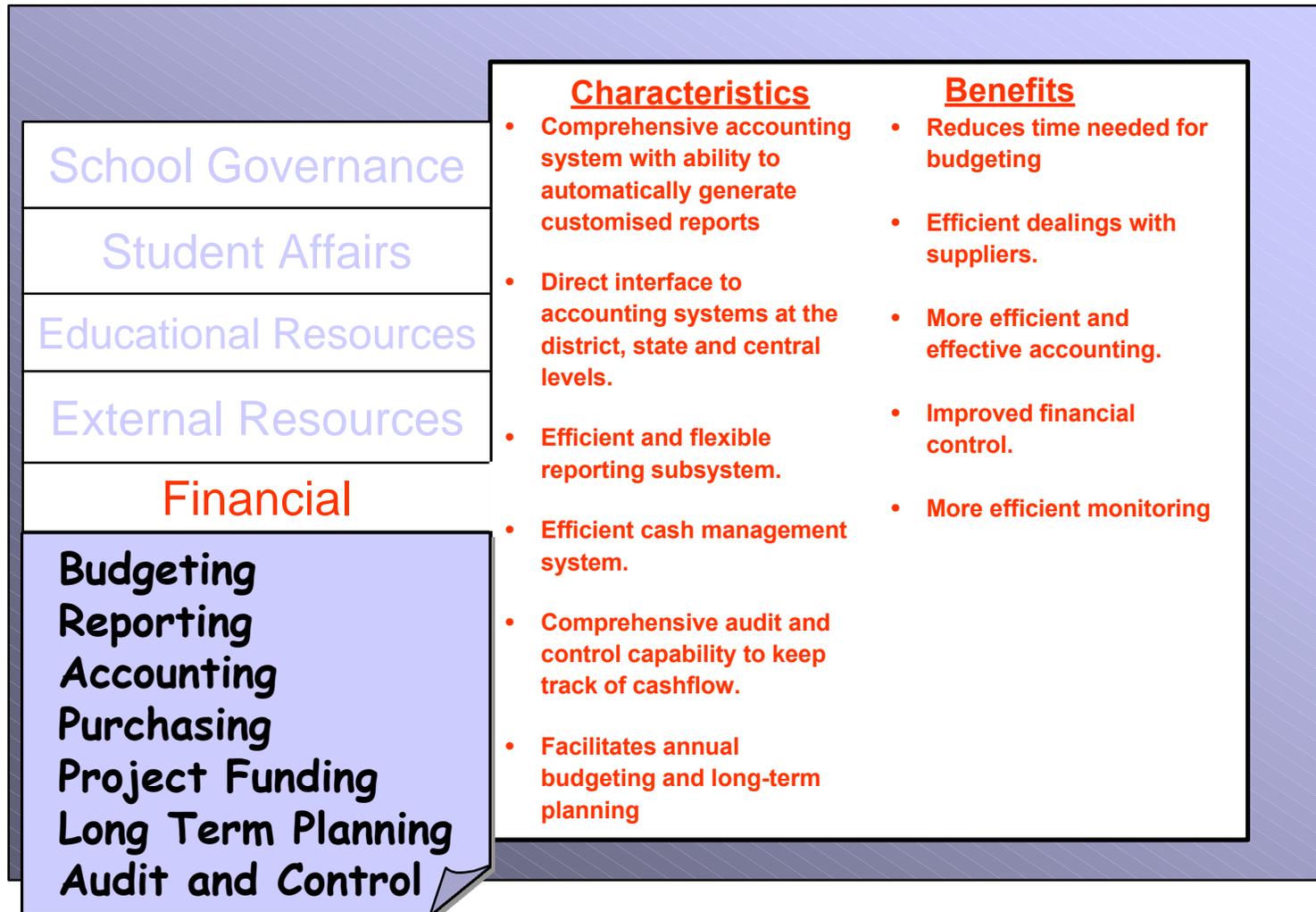
The Educational Resources component deals with managing the usage of such resources for teaching-learning:



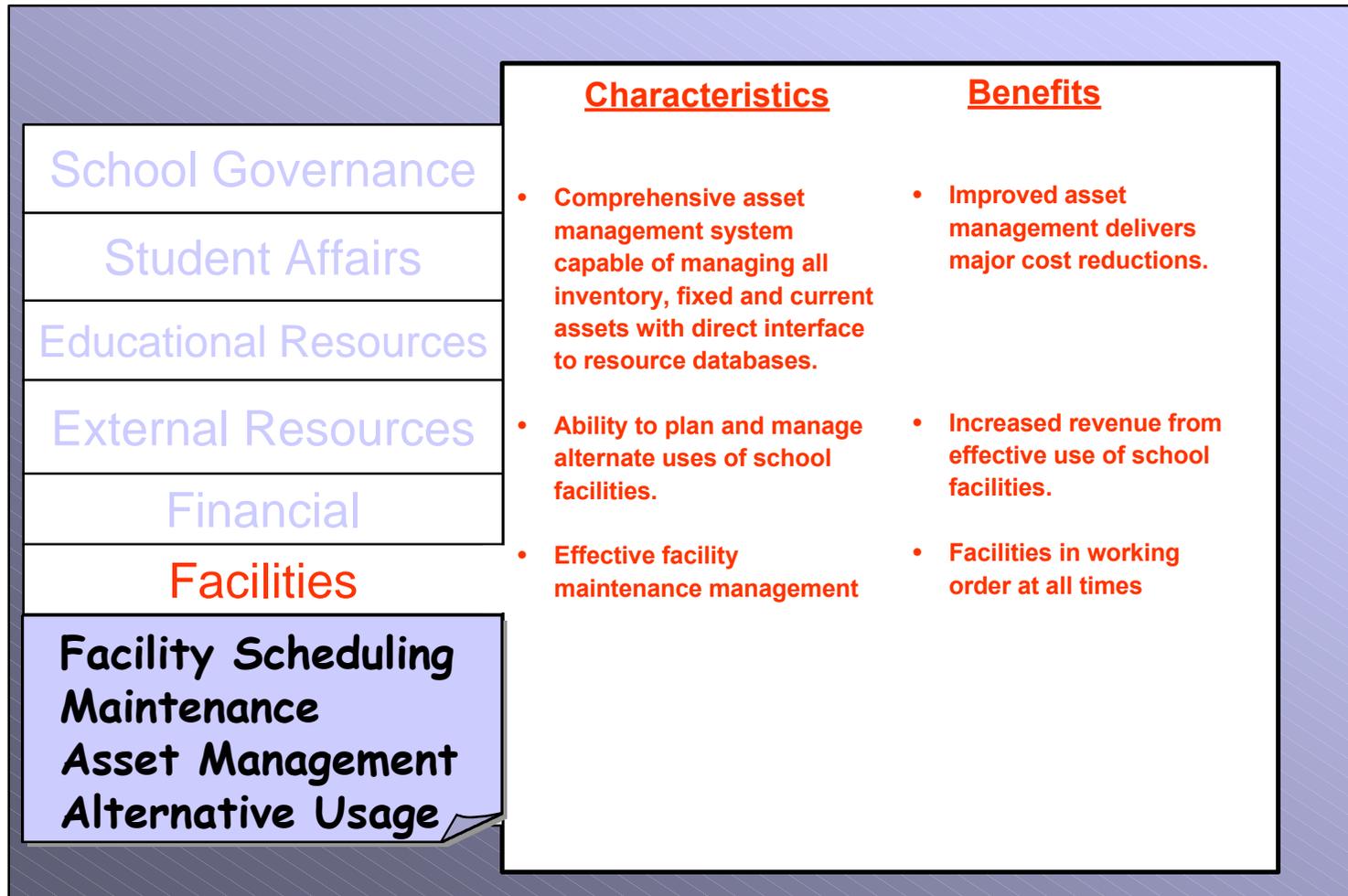
The External Resources component deals with the management of resources and constituencies outside the school:



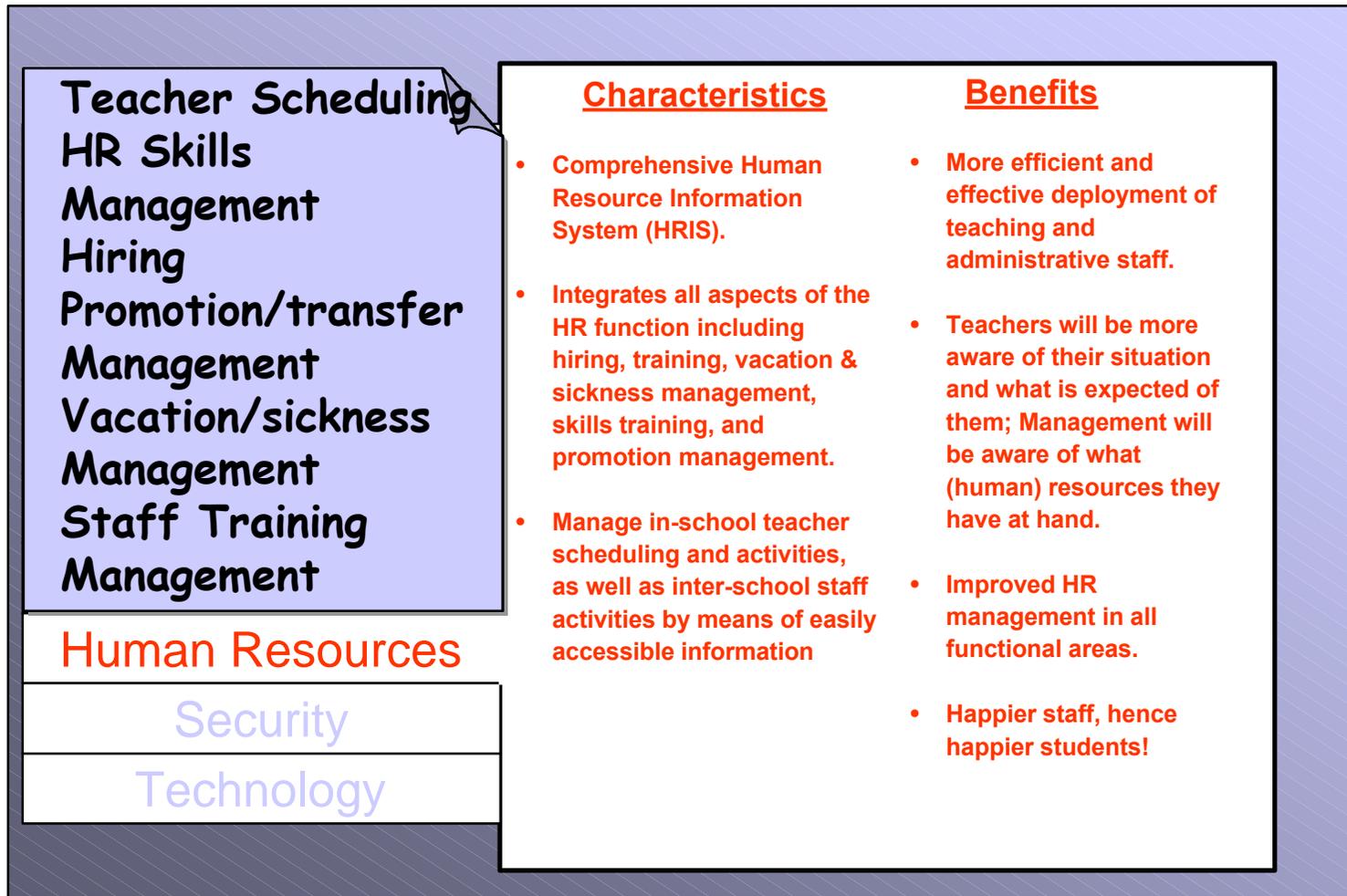
The Financial Management component handles the day-to-day and long-term financial matters:



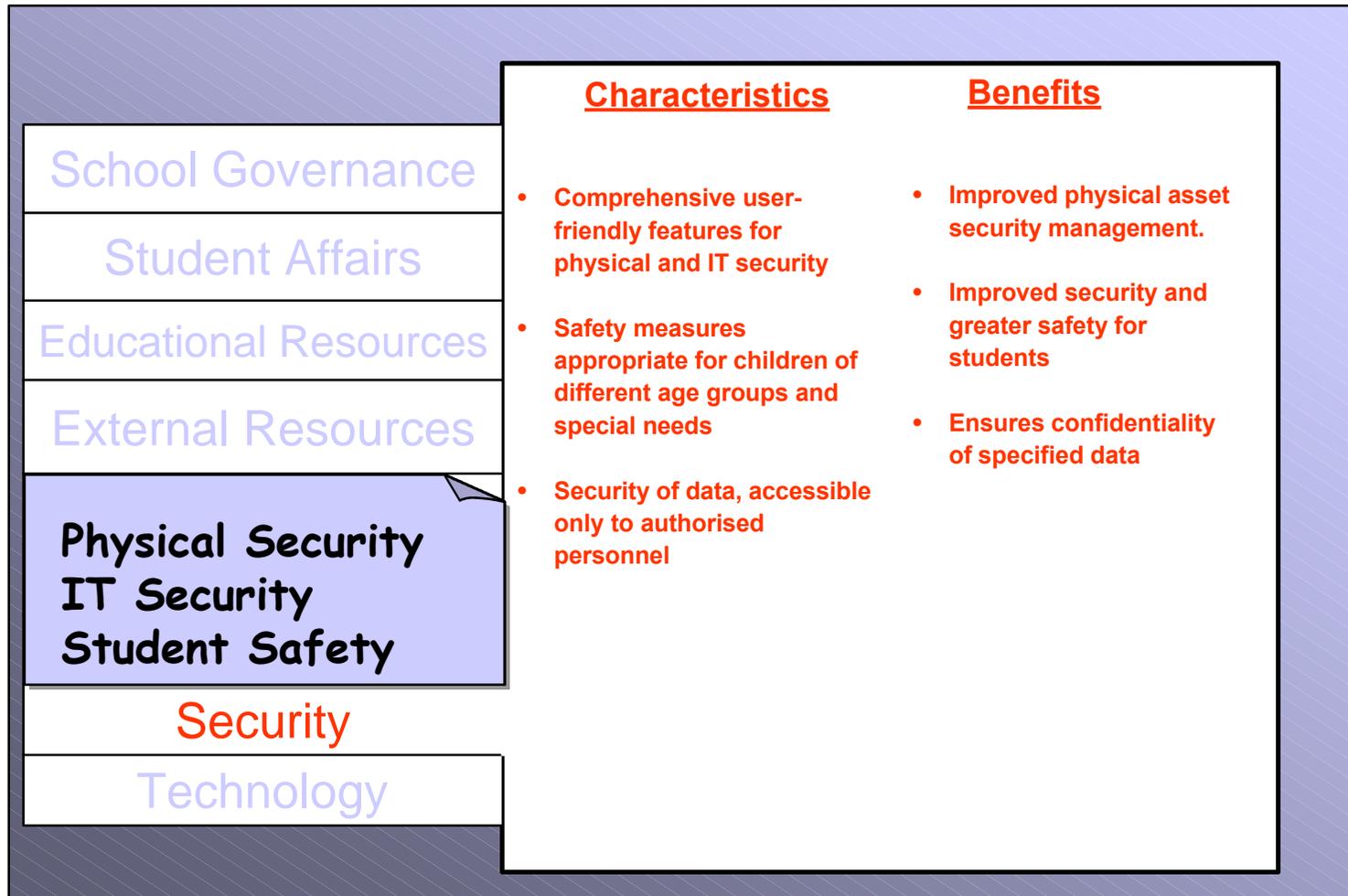
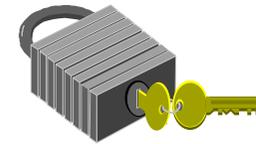
The Facilities Management component is involved in maintaining and managing the utilisation of school facilities:



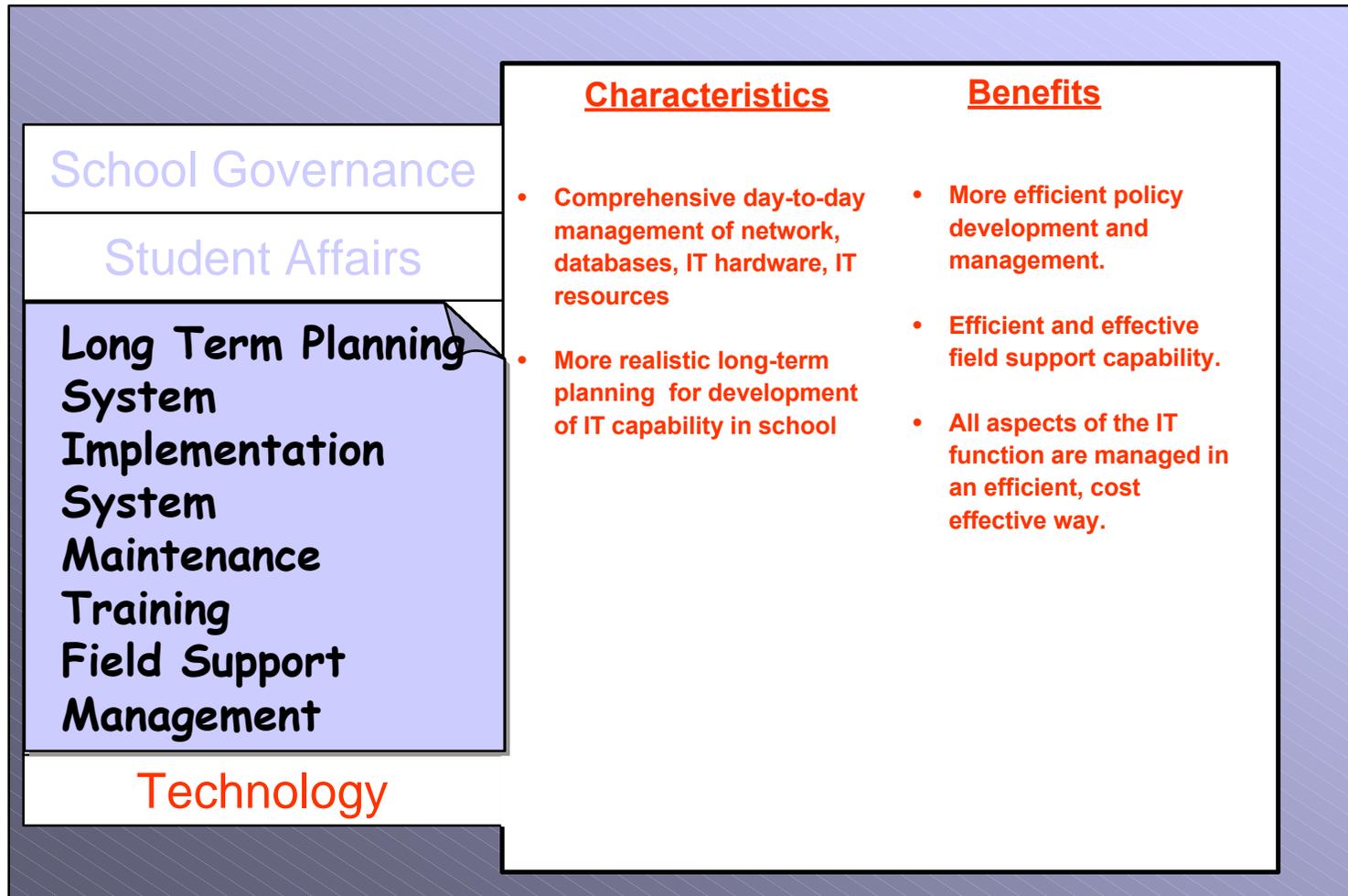
The Human Resources Management component handles the organisation, maintenance and development of school staff, including teachers and school administrators:



The Security Management component is responsible for physical and student safety in the school:



The Technology Management component implements, maintains and manages the technological components of the school:



# The Malaysian Smart School Processes and Scenarios

### Smart School Processes

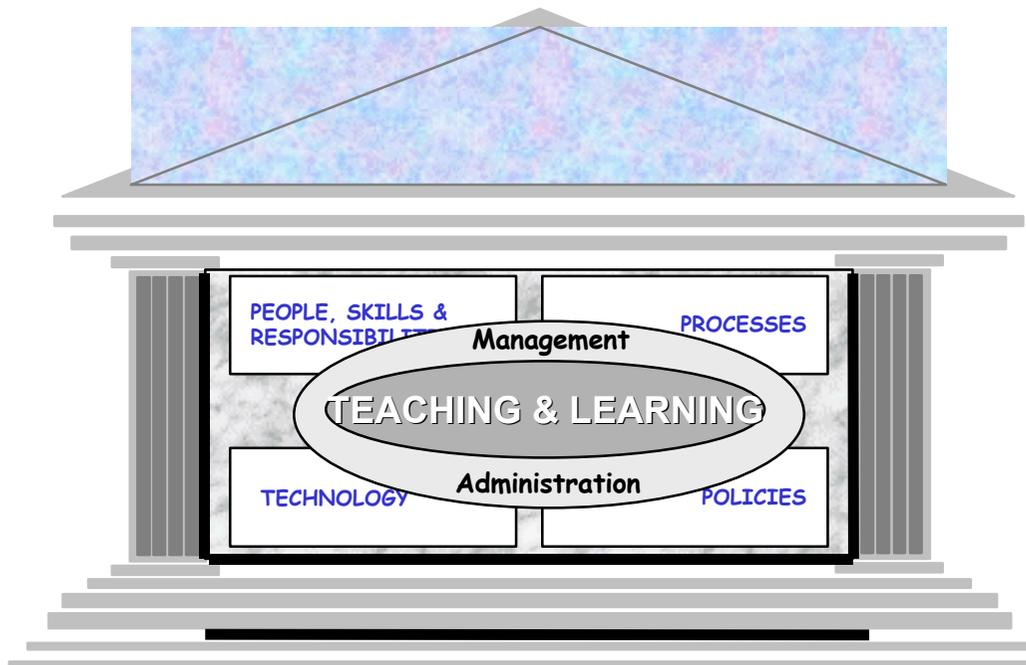
The purpose of this Section is to provide the reader a glimpse of how the conceptual components elaborated in previous sections can be put to work. The Smart School processes, one of the four core components supporting the teaching-learning and management details some of the highlights of events within the school.

#### How to read this Section

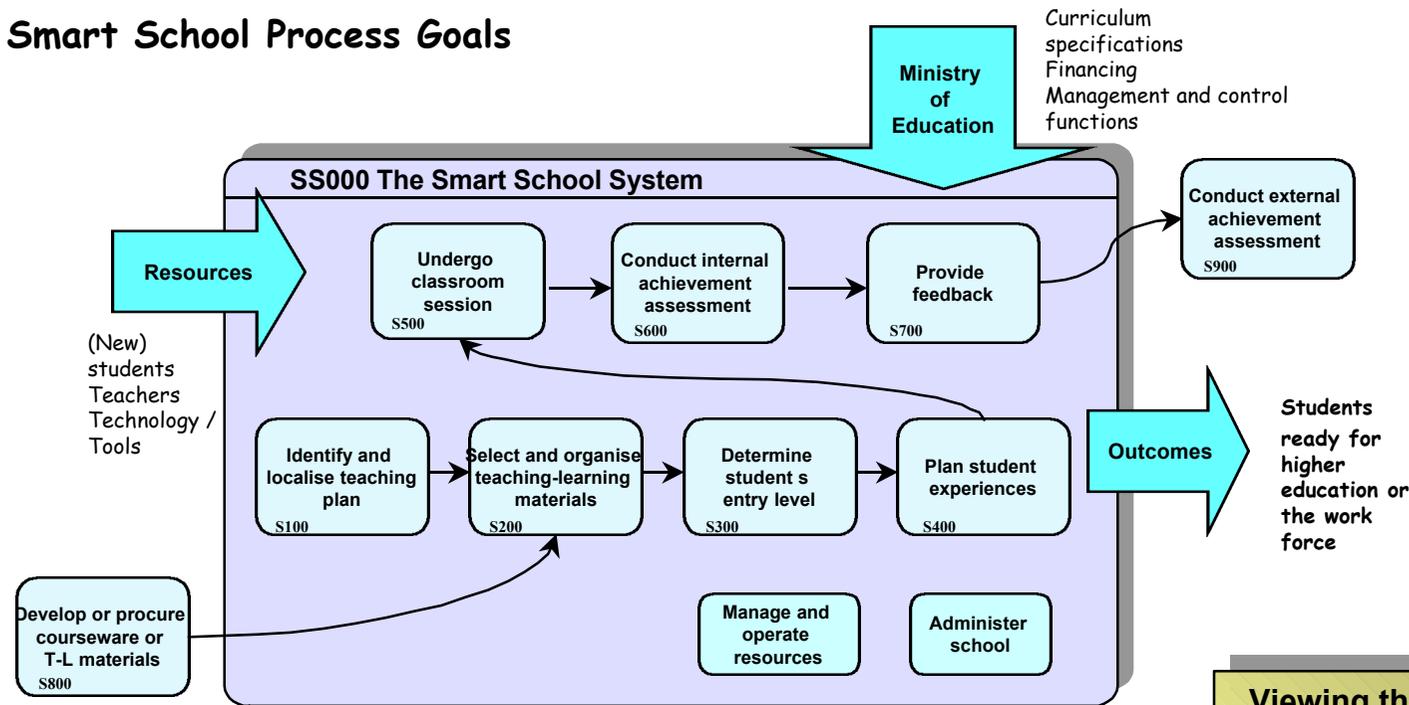
This Section begins by identifying the core processes in the school system today, and the main challenges to overcome in the Smart School system. The Smart School system processes inputs and transforms them to the desired outputs. Following the discussion of the core processes, the Section introduces several scenarios portraying highlights of everyday life in a Smart School.

#### Related Materials

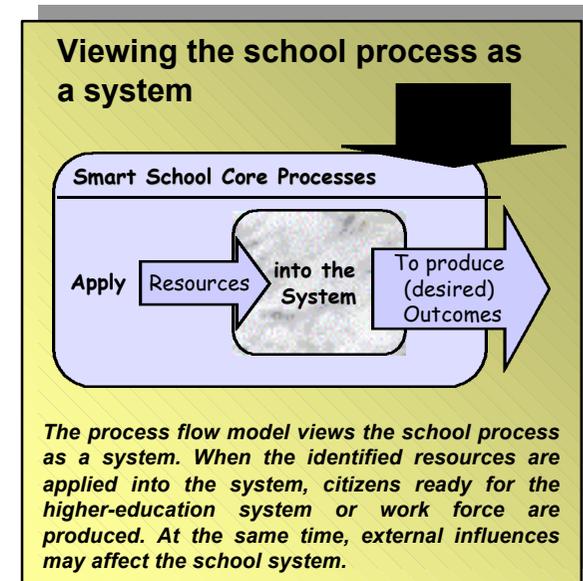
Appendix 3 contains high level Process Flow diagrams of the current and Smart School system.



Smart School Process Goals



The Smart Schools flagship application provides an opportune time to re-assess the current schooling system. Initially, the Project Team identified the people, their skills and responsibilities, the policies and practices, and the technology, tools and materials used in schools today. A conscious effort was then made to identify the problems and challenges that the school and its people faced in the current system. A plan was then drawn to overcome these challenges, complemented with the appropriate people development strategy, and the appropriate use of enabling technologies.



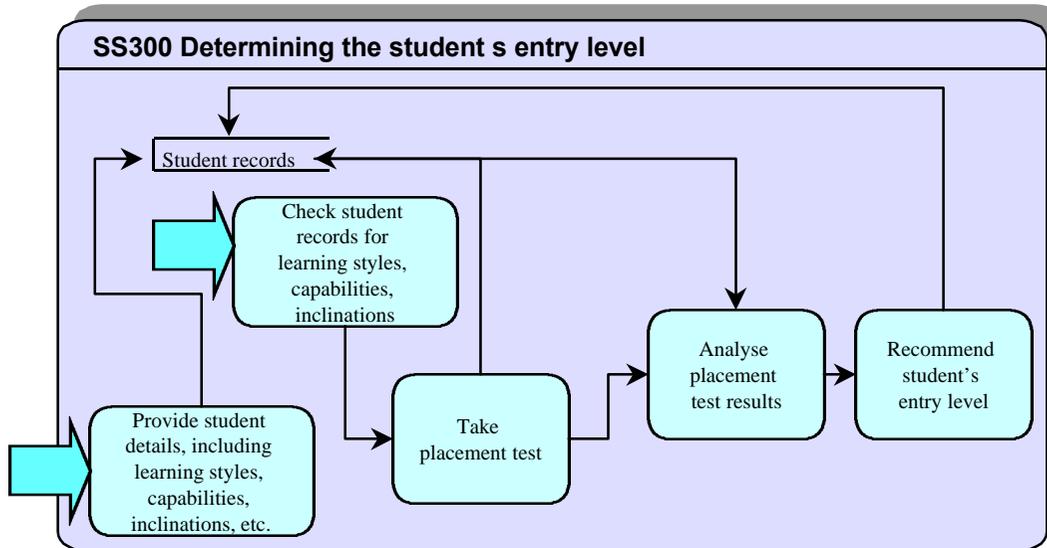
**Example of an improved process to determine the student's entry level:**

In the current schooling system, students are placed in the classroom with little understanding of their individual needs and capabilities. Any diagnosis, if done at all, is to stream students to different classes according to overall academic achievements. The individual's strengths and weaknesses are seldom assessed, and their different learning styles are usually not catered to. Teachers often cater to the average in the classroom.

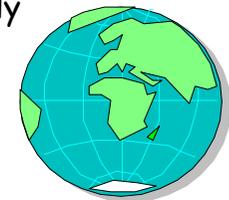
The Smart School process will change the way children are taught ; their diversity is regarded as a strength rather than a barrier to teaching. Children's individual differences, needs, capabilities and learning styles are diagnosed early to enable teachers to plan the children's learning experiences more effectively. Learning is then optimised to each child. Individual minds, spirits and physical selves are catered to rather than the treatment of the class as a homogeneous collective whole.

**Problems and Challenges to be addressed in Smart School**

- Students are passive
- Parents are not involved
- Teachers are doing too much non-teaching tasks
- Students need to be trained for the Information Age
- School is an "island"
- Exam-orientated
- Non-collaborative
- Learning not fun
- Learning is not for the real world
- Lack of variety in the teaching materials and methods
- Limited thinking skills



Determining the student's entry level will ensure that instruction capitalises on the individual student's strengths and preferences while simultaneously removing barriers to learning.



A day in the life of a Smart School student - some highlights

Electronically send draft of a report to other members of the group for their comments and edits.  
Post question to the Malay language teacher about doubts on the lesson in class today

Play a computer-based simulation groupware game on discovering Africa using virtual reality and sounds

Organise information collected in a term project on water pollution in the community and use this to write a report on current problems and possible solutions

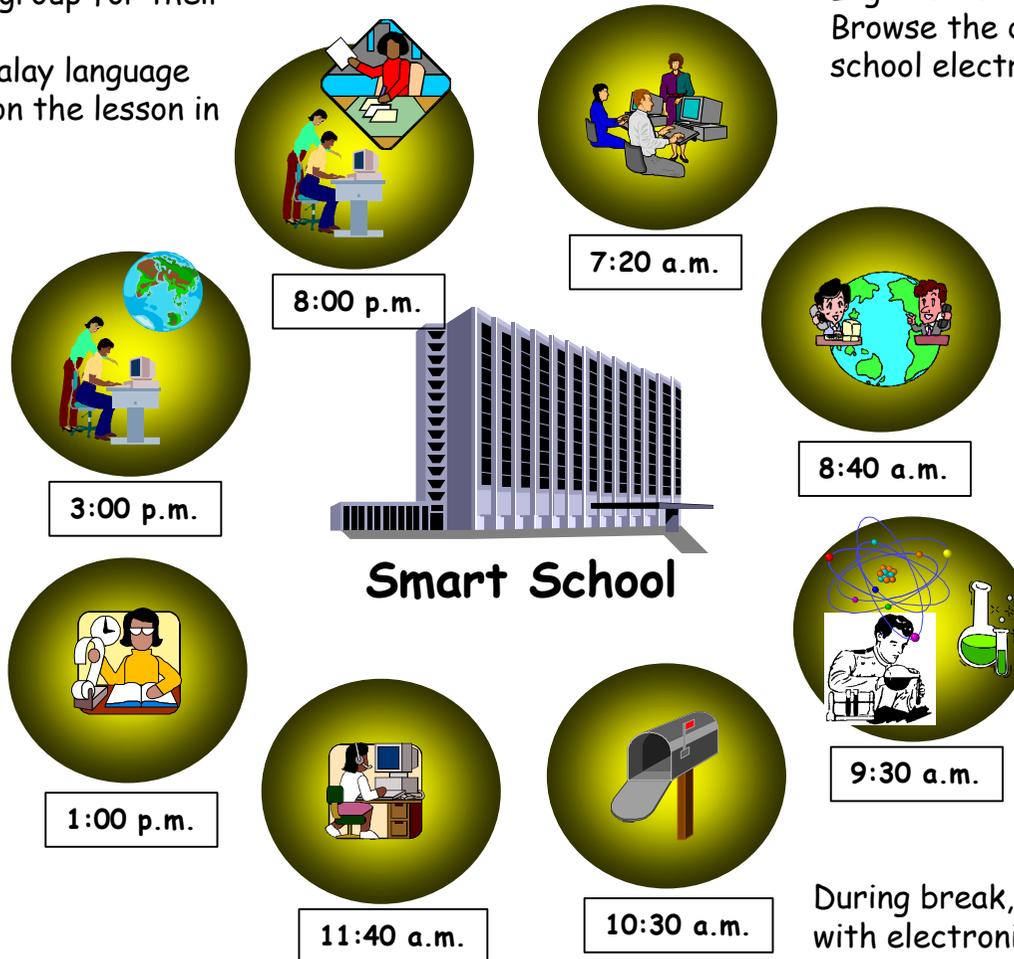
Present an oral report in front of the class that is videotaped to go into the student portfolio

Log in attendance electronically  
Browse the days activities on the school electronic bulletin board

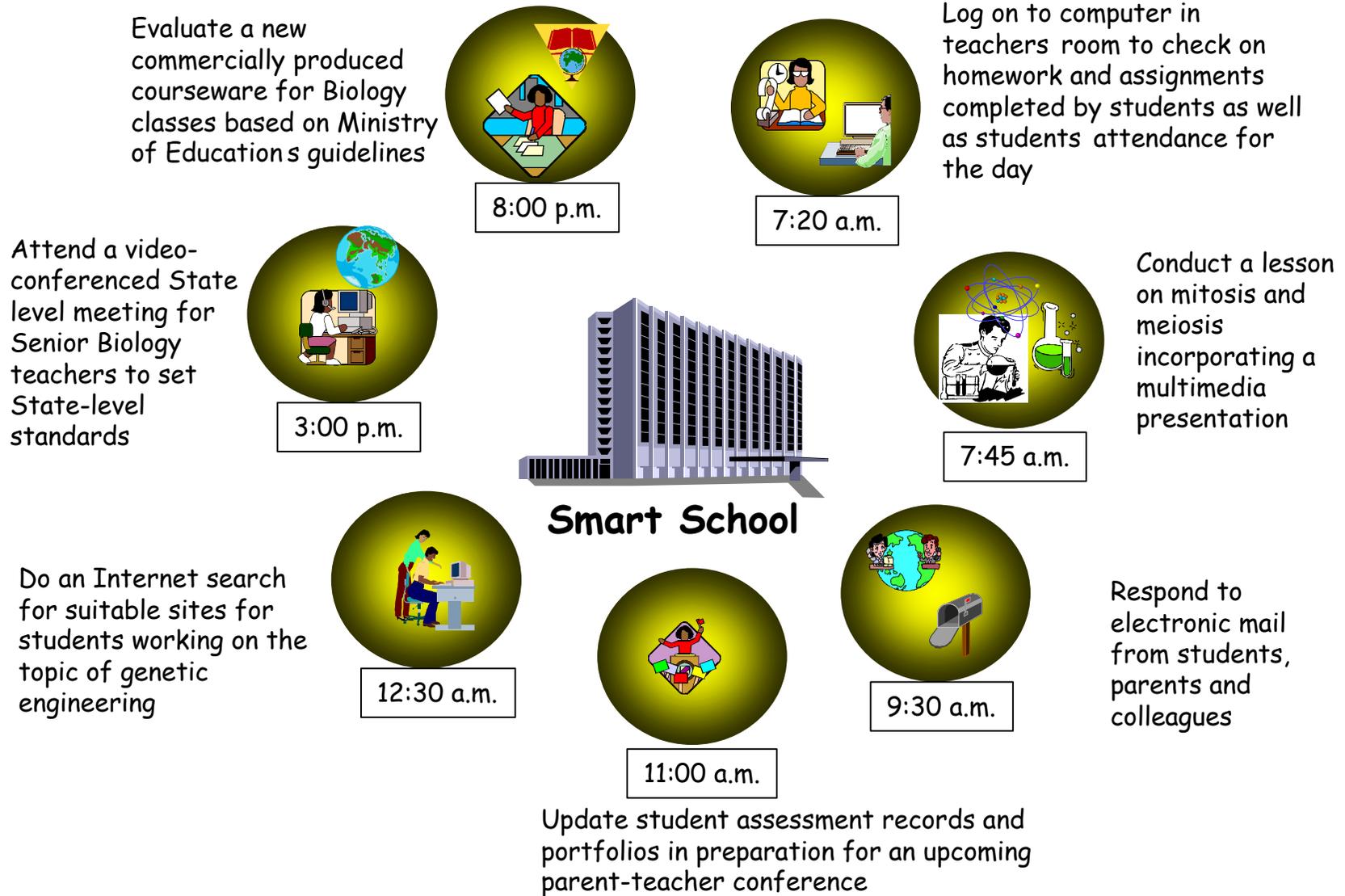
Participate in a video conference on the spread of AIDS in Asia

Listen to the science teacher's multimedia presentation of the atomic model

During break, catch up with electronic mail



A day in the life of a Smart School teacher - some highlights



A day in the life of a Smart School principal - some highlights

Visit Principals Corner , a discussion group on the Internet

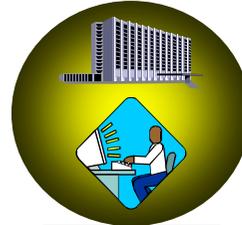


5:00 p.m.

Respond to e-mail



4:00 p.m.



8:30 a.m.

Participate in a video conferenced meeting of secondary school principals in the district to discuss discipline issues



10:30 a.m.

Send e-mail to staff and parents to inform about latest developments in regulations regarding student discipline



Smart School



2:00 p.m.

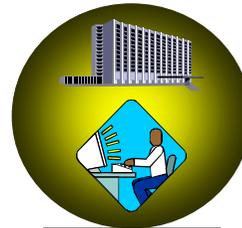
Attend staff meeting to discuss the upcoming school Sports Day and to delegate duties



1:00 p.m.

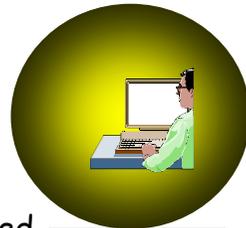
Access a student s progress records from the school database in preparation for a meeting with his parents regarding his underachievement in class

A day in the life of Smart School parents - some highlights



9:00 a.m.

E-mail son's class teacher to arrange for a conference to discuss his progress in year 5 Science  
Check e-mail for replies to requests for donations of equipment to the school



8:00 p.m.

Attend an evening course on Introduction to Multimedia for members of the community conducted in the school computer lab



Parents



11:00 a.m.

Go in to school to give a talk to daughter's class on local ferns and share some interesting samples of ferns with them

The Smart School as the centre of the community - some highlights



Senior citizens use the computers in the school resource centre to access the internet and use e-mail

MON - FRI  
5.00 - 8.00 p.m.



Play group session in the playground/gym for children (1-5 years) in the community

MON & WED  
3.00 - 4.30 p.m.

Various community meetings are held in the school from time to time



TUES & THURS  
5.00 - 8.00 p.m.



Community

Youths in the community use the schools facilities for badminton and football



TUES & THURS  
5.00 - 8.00 p.m.



Introduction to Computing course for adults in the community

MON & WED  
7.00 - 9.00 p.m.

# The Malaysian Smart School People, Skills and Responsibilities

**People, Skills and Responsibilities**

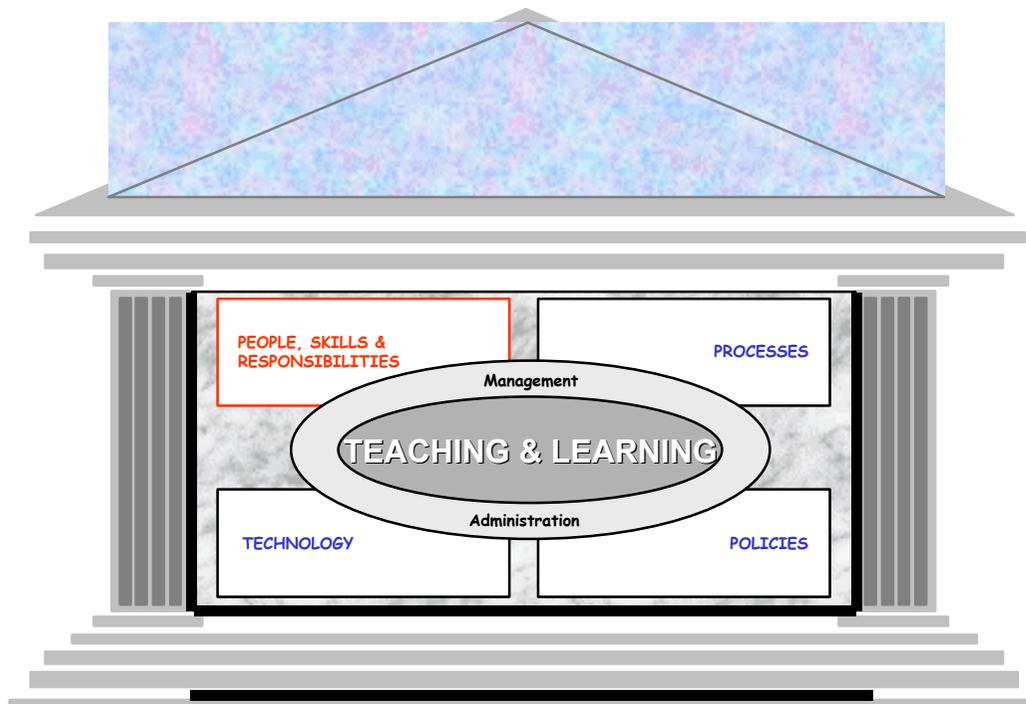
The Smart School has a commitment to provide equal opportunities for all students with different needs and capabilities so as to enhance their capacity for learning. This commitment involves the development of the main stakeholders who are involved in the delivery of Smart School teaching. This will represent a revolutionary departure from traditional modes of teaching currently practised. The main stakeholders will include teachers, principals, support staff, parents and the wider community, all of whom must be prepared and enabled to guide students in Smart Schools.

**How to read this Section**

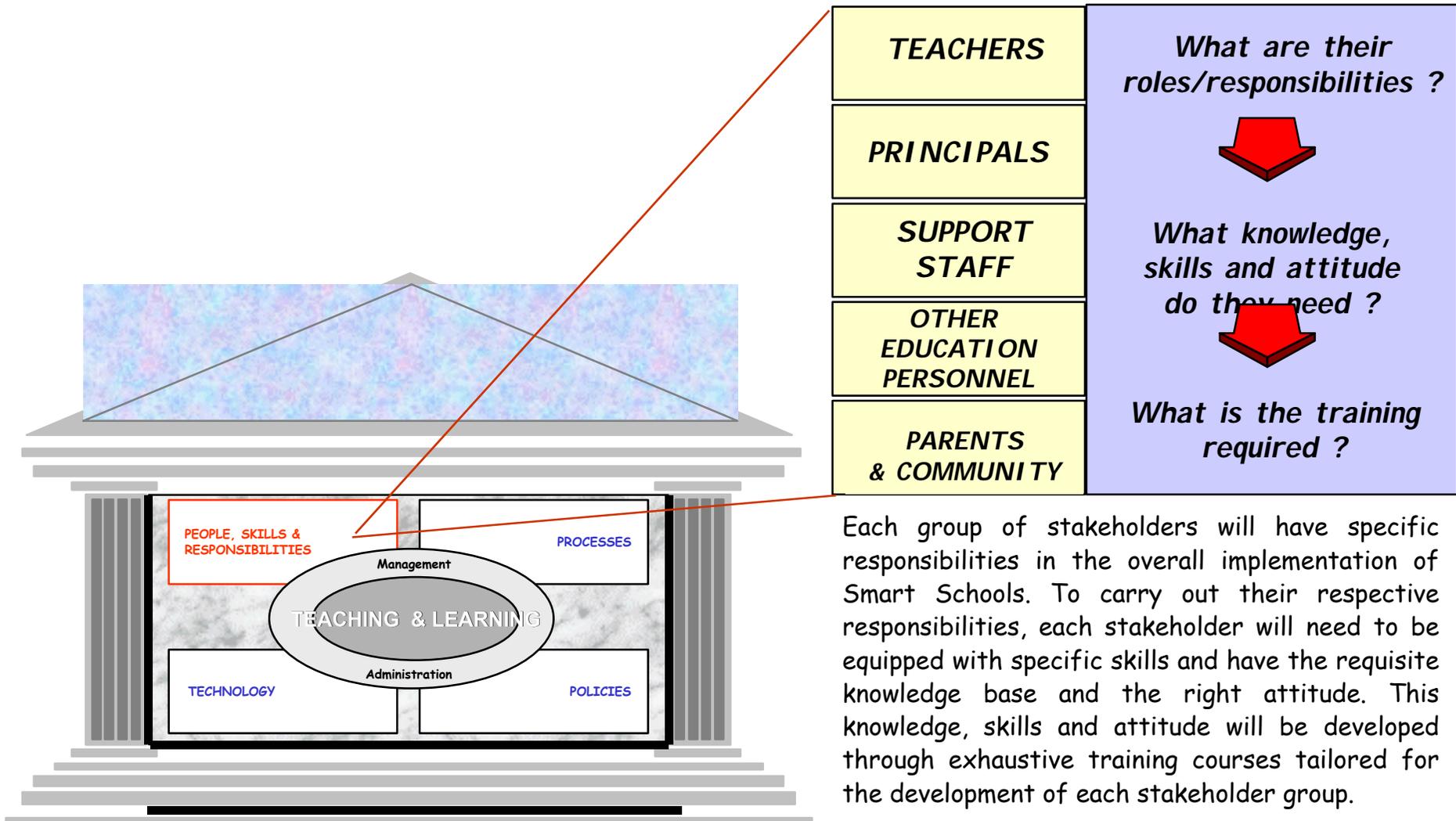
This Section begins with the overall strategy to equip the main stakeholders with the necessary skills and knowledge in line with their roles and responsibilities. Next, the training outline for each of the main stakeholders is discussed.

**Related Materials**

Appendix 4 contains an elaboration of the programme for the professional development of Smart School teachers. The main roles and functions of these teachers are also included.



The stakeholders involved in the implementation of Smart Schools.



Each group of stakeholders will have specific responsibilities in the overall implementation of Smart Schools. To carry out their respective responsibilities, each stakeholder will need to be equipped with specific skills and have the requisite knowledge base and the right attitude. This knowledge, skills and attitude will be developed through exhaustive training courses tailored for the development of each stakeholder group.

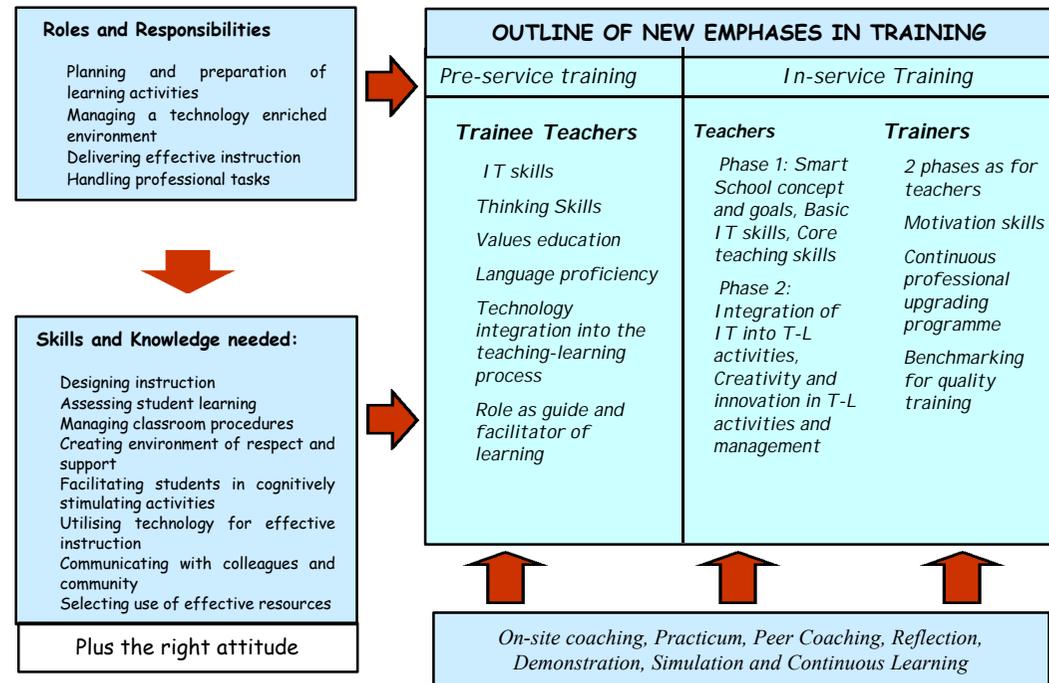
Smart School Teacher Development

Teacher development will be the most critical component as teachers will be the primary deliverers of Smart School teaching. A comprehensive teacher education programme incorporating best practices in technology supported learning will be critical to the success of the Smart School initiative.

These teachers will need intensive training on Information Technology skills and technology integration into classroom instructions to enhance thinking and creativity. In addition, Smart Schools teachers need to be trained as guides on the side, facilitating and encouraging students to take charge of their own learning.

The training should allow participants to explore a wide variety of areas and strategies as well as the opportunities to engage in practicums that represent the reality they would face.

Continuous learning is a crucial ingredient as it is necessary for teachers to keep abreast of development in their professional practices and to be confident with technology.



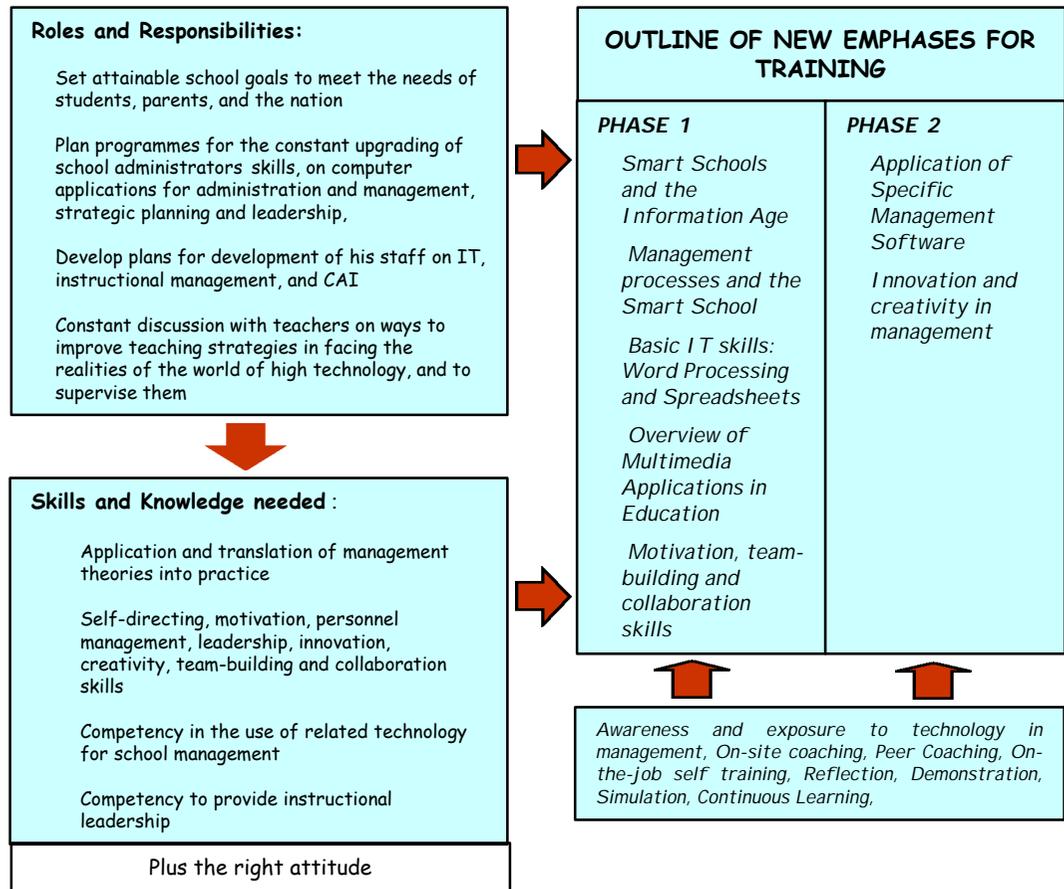
The pre-service and in-service professional development programmes will have new emphases in nurturing the qualities and practices of teachers in order for them to function in a technology enriched environment.

Smart School Management Training for Principals

The task of managing schools involves working with information and building on ideas collaboratively. The efficiency and effectiveness of this management task in a Smart School are enhanced through the use of technology.

The change being brought about in the planned conversion of all Malaysian schools into Smart Schools is indeed a serious one which can cause apprehension in all those involved. A major part of most resistance to change may be attitudinal. To a smaller extent resistance is due to the lack of skills although there is desire to change.

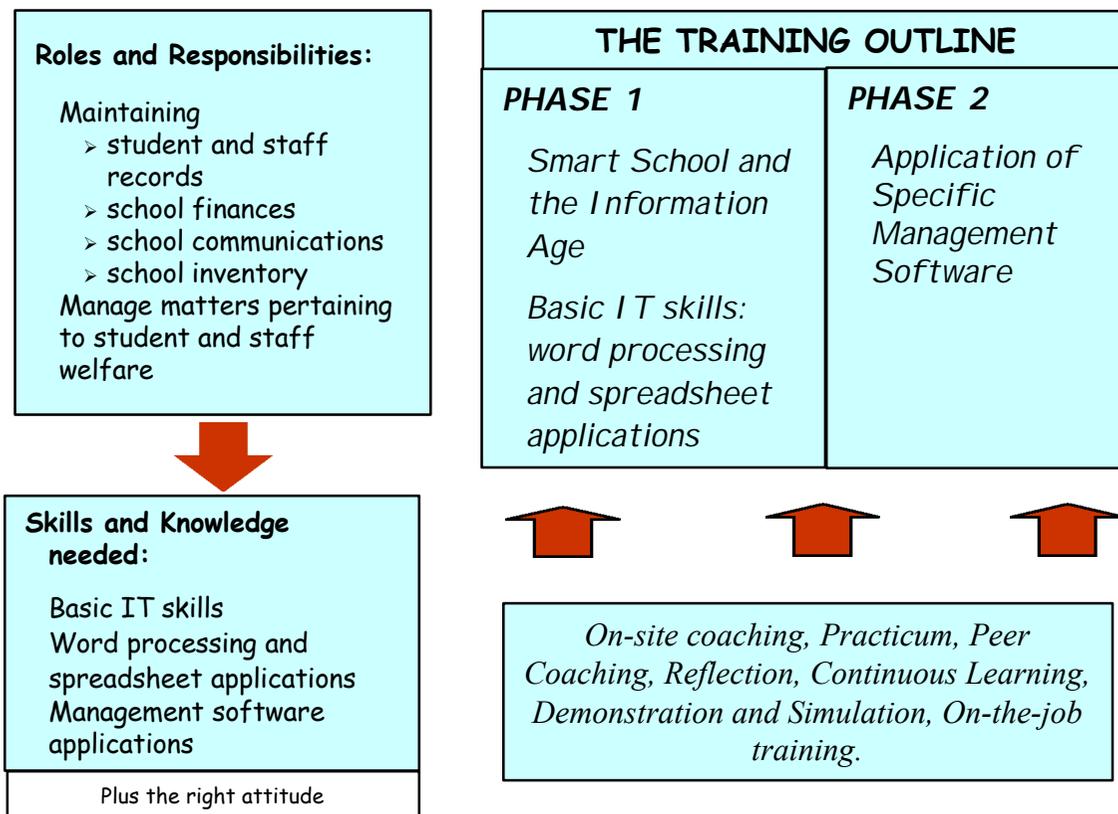
Thus, Smart School principals will need to go through an intensive management training course to equip them to manage the new facilities, technologies and methodologies to be deployed in Smart Schools.



A coherent training framework should be set out, with the appropriate emphases on new technologies and methodologies.

Smart School Clerical Staff Development

The school clerical staff are the school clerks, typists and office boys. Their responsibilities include maintaining student and staff (teaching and non-teaching) records, school finances, school communications, school inventories and matters pertaining to student and staff welfare.



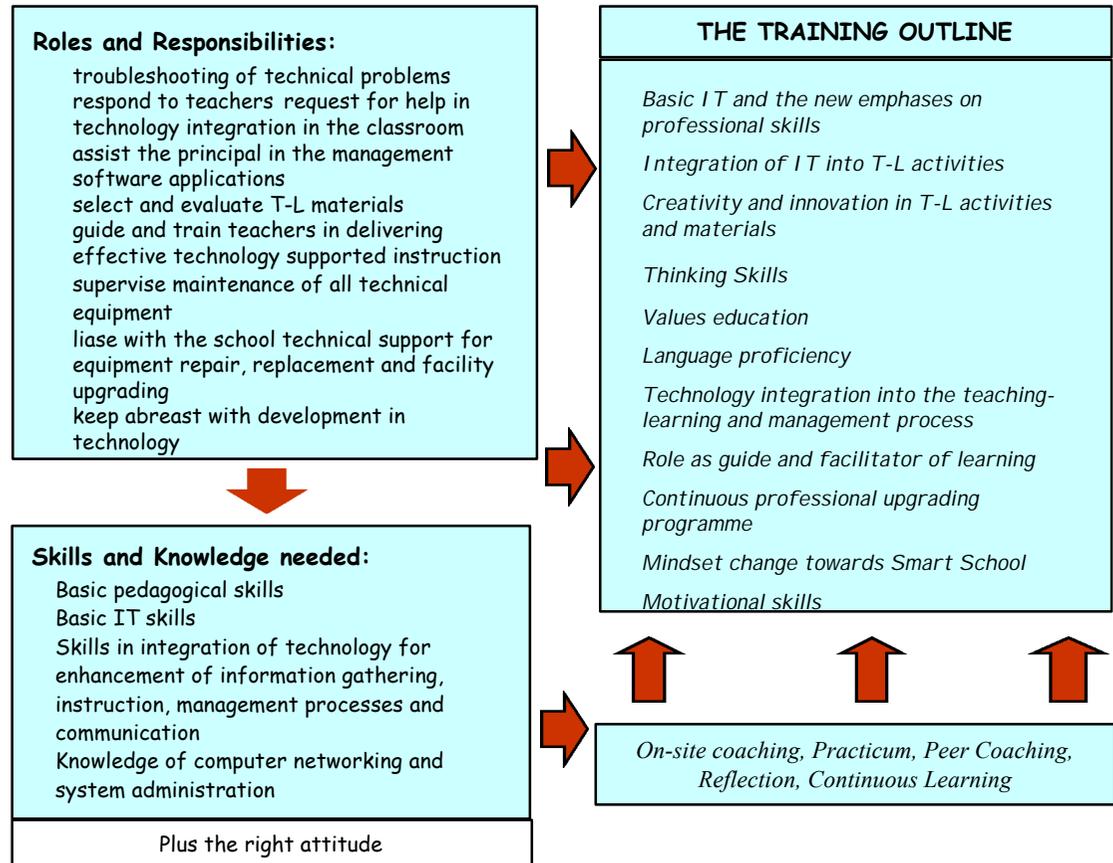
In the Smart School, these tasks will be accomplished with the aid of technology. The members of the clerical staff would need to understand how this office automation is done. They should be introduced to basic IT skills such as word processing and spreadsheet applications. Sufficient hands-on training in the management application software deployed in the Smart School must be provided. Education in the new technology alone is not enough. They need to better understand the new school processes and give their support wherever necessary.

**Smart School Media/Technology coordinator**

For each Smart School, there needs to be a Media/Technology coordinator who will be responsible for supporting teachers in the overall deployment of multimedia and other technologies in the delivery of Smart School teaching.

The technology coordinator is entrusted to guide and help train teachers in delivering effective technology supported instruction. Thus the technology coordinator should be a teacher with skills in integration of technology for enhancement of information gathering, instruction, management processes and communication.

Other responsibilities of the technology coordinator include assisting the principal in the management software applications as well as keeping abreast with development in education technology.

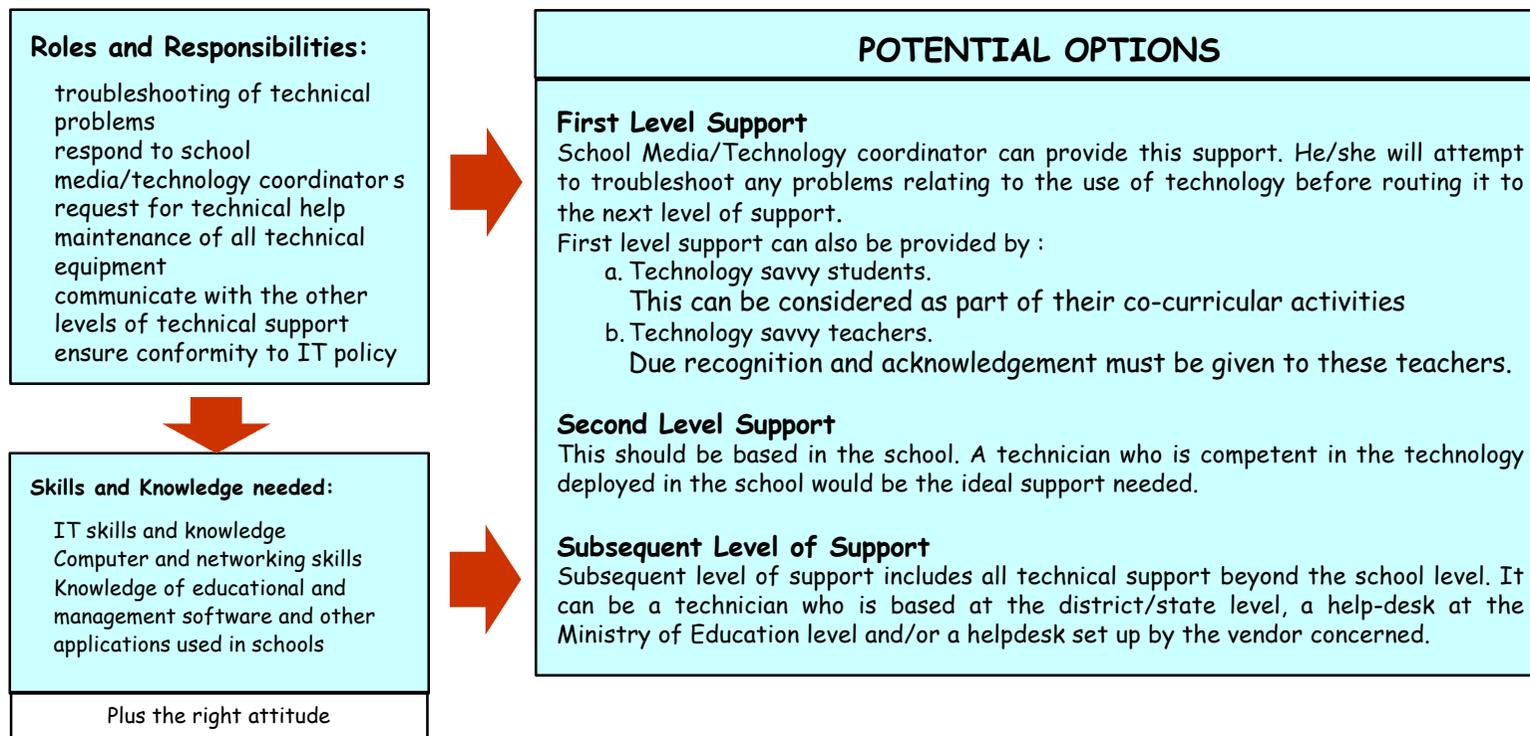


Apart from the pedagogical issues the technology coordinator will also supervise maintenance of all technical equipment and liaise with the school technical support staff team for equipment repair, replacement and facility upgrading as and when necessary.

**Smart School Technical Support**

Technical support is critical to the maintenance of all installed hardware and software to ensure minimal disruption to the teaching-learning and management process. Thus, every Smart School should have a well defined technical support organisational structure which will provide help-desk function to Smart School students, teachers or administrators who require assistance in solving technical problems.

A number of organisational options can be deployed to ensure a tight, coherent centralised support organisation backed up at the local level by self-sufficient teams based at either individual or identified clusters of Smart Schools.



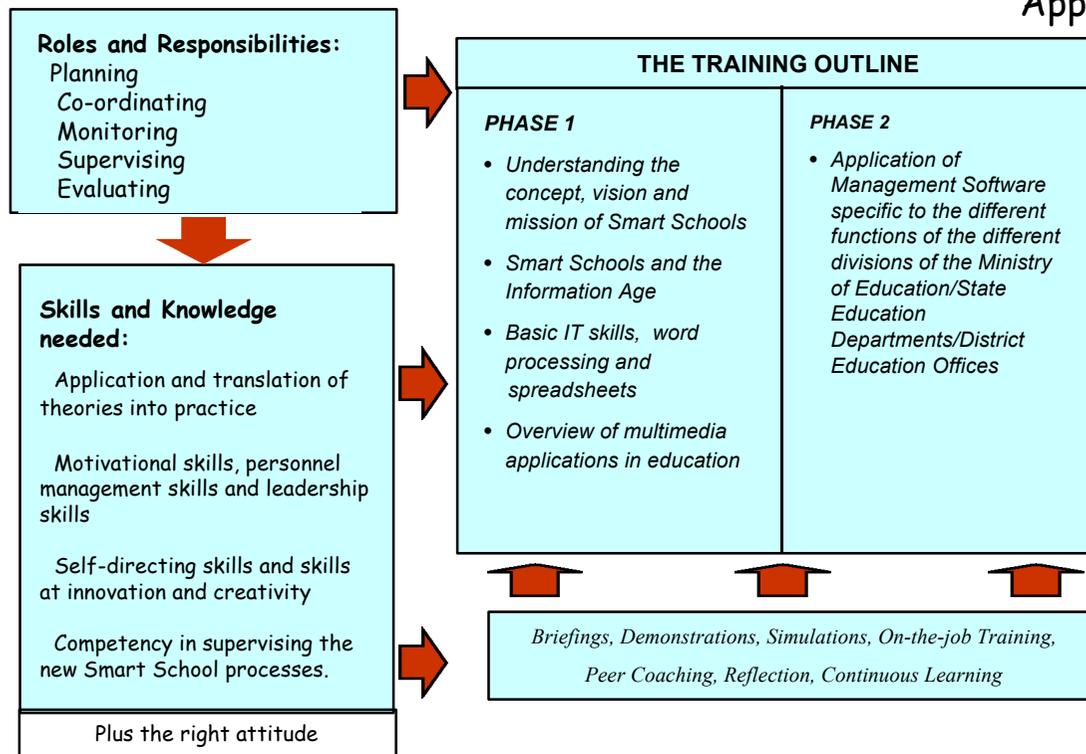
**Professional Development for other Education Personnel**

Officers from the various divisions of the Education Ministry, State Education Departments, District Education Offices need to understand the educational objectives and policies of the Smart School in fulfilling their respective roles.

The training curriculum for the officers have to be geared towards their specific responsibilities in the Smart Schools.

The training outline for these officers should include:

- Smart School vision and objectives
- Their role and responsibilities in the Smart School
- IT literacy
- The teaching-learning and management processes in the Smart School
- Application of new approaches to their tasks



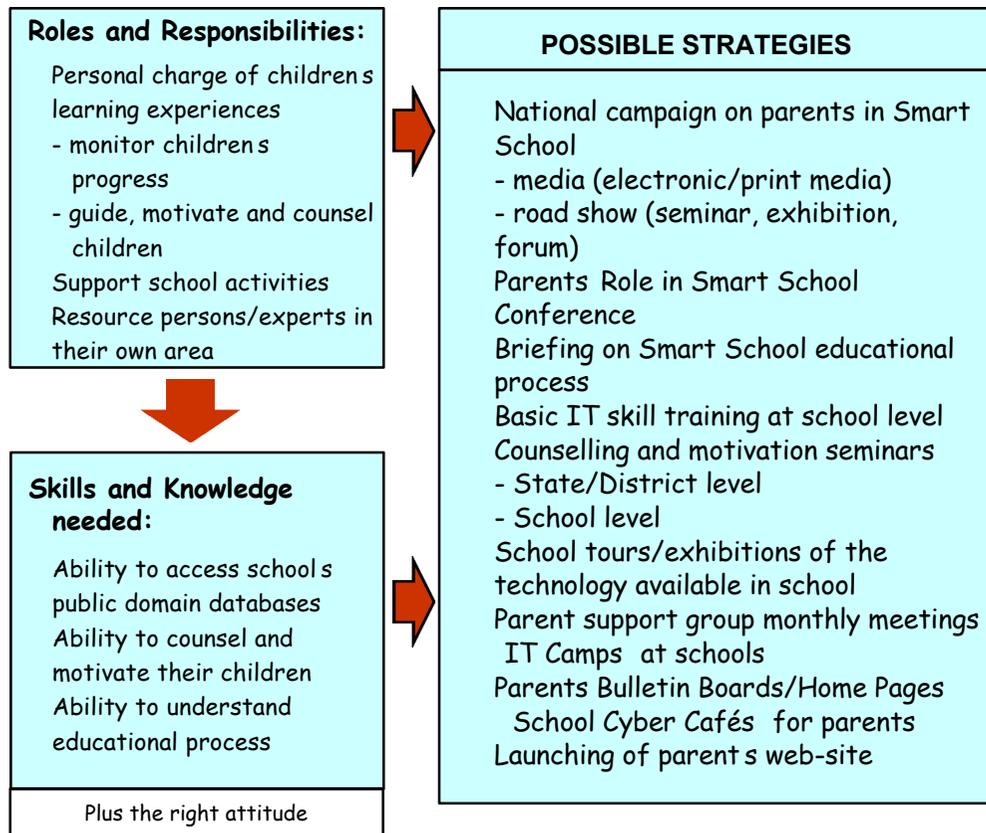
Education officers are crucial to the success of the implementation of the Smart School project as they play a major role in the planning, co-ordinating, monitoring, and evaluating the implementation activities at the various levels. Part of the training should therefore concentrate on developing the awareness and acceptance of the Smart School concept.

**Parents of the Smart School students**

Parents of Smart School children play a critical role in achieving the goals of Smart Schools in delivering education and developing balanced and holistic students. There is a need to increase the participation of parents in educational processes such as in teaching-learning, development of

educational materials, assessment, etc. A student's learning opportunities stretch beyond the classrooms. Parents can be educational resources, and in the process benefit themselves as their own learning needs become a life-long endeavour. Research has also shown that children are more successful in school when parents are involved in their education.

The roles and responsibilities of Smart School parents must be widely acknowledged and accepted, in order to create significant buy-in for parents to assume a much stronger role in the Smart School education process. There are a number of strategies that can be adopted to increase the participation of Smart School parents both in the delivery of education as well as in the supervision of children outside of school.



# The Malaysian Smart School

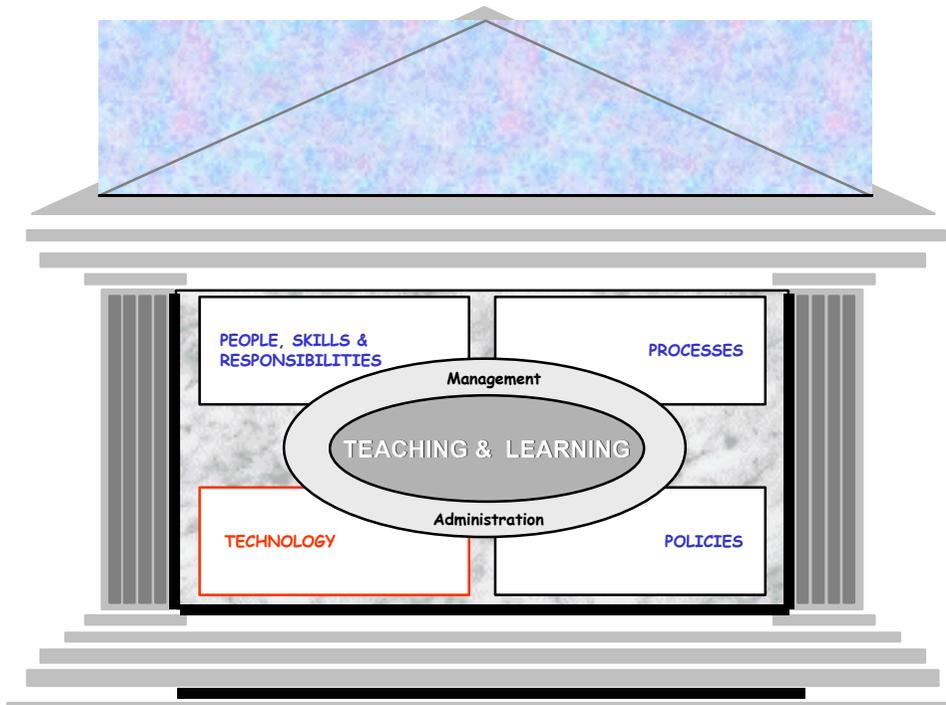
# Technology Enablers

Smart School Technology Enablers

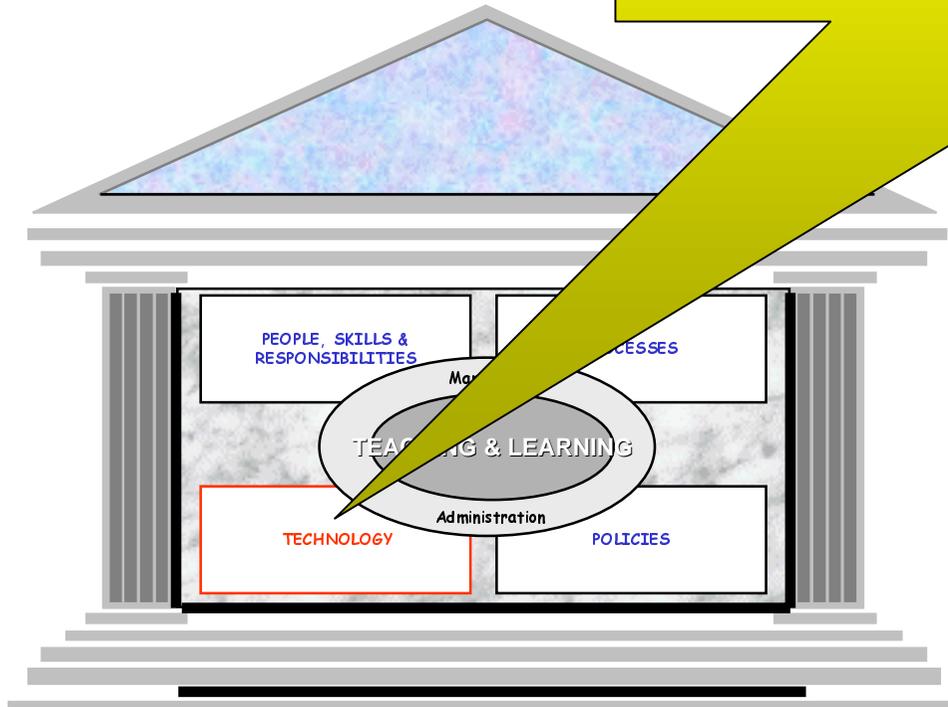
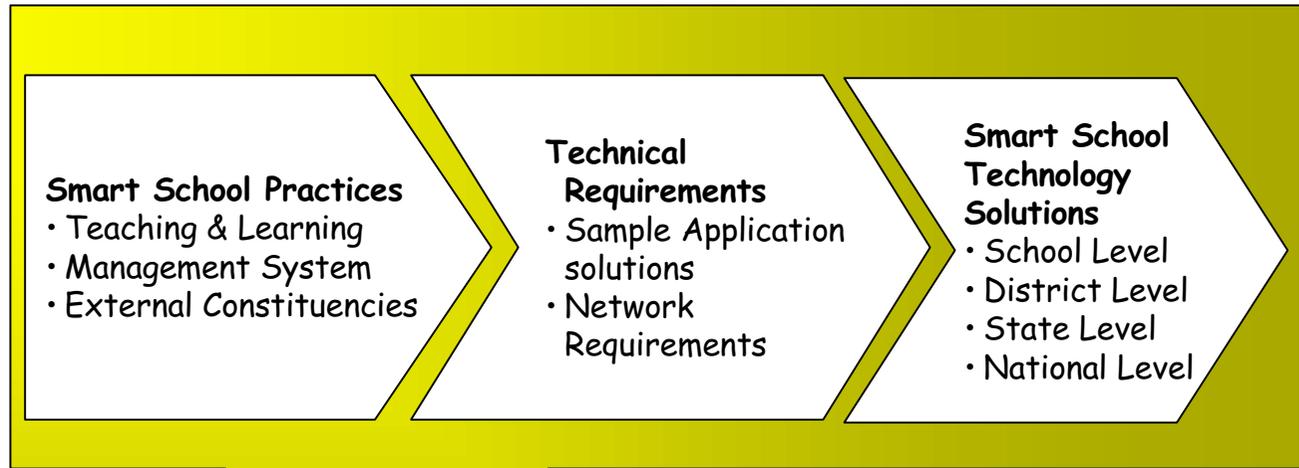
The purpose of this Section is to suggest the technologies that will support Smart Schools in Malaysia, namely, the technologies and infrastructure required for the teaching-learning, management, the connectivity to the external constituencies and the Educational Network connecting the Smart Schools.

How to read this Section

This Section begins by illustrating the various implications of Information Technologies to the teaching-learning process, management, and linkages to external constituencies. Following each implication scenario, a chart of possible technical solutions are presented. Next, several options of school, district and national level technical solutions are presented. Finally, the network configurations for the three levels are broadly proposed.



The Technology Derivation Process



The Information Technology implications of the Teaching-Learning Process

Examples of Teaching & Learning Practices

IT Implications

Self-Exploratory Learning

Every computer shall have access to the latest educational materials available locally, as well as to external resources

Collaborative Learning

Tools that facilitate group work within the class and across classes

Distance Learning

Communication with outside constituencies using technology, i.e., video conferencing, e-mail, video on demand, broadcast, etc.

Experiential Learning

Simulation software and virtual reality to stimulate learning

Research, Reference, and Data Collection

Tools to search, collect and collate information

Electronic Assessment

On-line assessment via a standard database and built-in assessment courseware

Inclusive Education

Tools to help students with disabilities cope with learning more effectively

Drill and Practice

Software or courseware that allows students to practise on their own or with peers

therefore Teaching and Learning Technical Requirements for these examples might look like the following...

Item \ Equipment	Stand Alone Computer	LAN	Local Server / Database	Network Resource *	Secure Network	Regional Server/ Database	Central Server / Database	Video Conferencing	Audio Visual	Other (specify)
Self-Exploratory Learning	●	○	○	●					○	
Collaborative Learning	●	●	●	●		○	○	○		Teleconference
Distance Learning	○			○				●	●	ISDN
Research, Reference and Data Collection	●	●	●	○		○	○			
Experiential Learning	●	○	○	●					○	
Electronic Assessment	●	●	●		●	●	●			
Inclusive Education	●	○	○	○		○	○	○	●	Artificial Intelligence
Drill and Practice	●	●	●	○		●	●	○	●	

● Must have    ○ Nice to have    \* Example: Internet

**Information Technology Implications of the Smart School Management System**

**School Management Functions**

**IT Implications**

**School Governance**

Using computer communication i.e, video conferencing, to link the school to the Ministry of Education for administration and policy implementation purposes

**Student Affairs**

Using computers and databases to maintain student profiles.

**Educational Resources**

Using computer communication to link the schools databases to central resource databases to regulate and organise educational resources

**External Resources**

Using computer communication to link the school to external constituencies like network resources, i.e., Internet, libraries and museums for the purpose of research, reference and data collection.

**Financial Management**

Using computer communication to link the schools databases to facilitate budgeting, accounting and reporting

**Facilities**

Using computer communication to link the schools databases to plan facility scheduling, maintenance and inventory.

**Human Resource Management**

Using computer communication to link the schools databases to the State Education Departments for human resource management purposes

**Security Management**

Using computer communication to link the schools databases to the District Education Office for security management purposes

**Technology Management**

Using computer communication for the purpose of acquiring centralised IT support for the school.

therefore the Management System Technical Requirements might look like the following...

Item \ Equipment	Stand Alone Computer	LAN	Local Server/ Database	Network Resource *	Secure Network	Regional Server/ Database	Central Server/ Database	Video Conferencing	Audio Visual	Other (specify)
School Governance	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		ISDN Teleconference
Student Affairs Management	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		<input checked="" type="radio"/>	
Educational Resources Mgmt	<input checked="" type="radio"/>									
External Resources Management	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		<input checked="" type="radio"/>	<input checked="" type="radio"/>		<input type="radio"/>	
Financial Management	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>		<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	
Facilities Management	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>						
Human Resource Management	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>			Smart Card
Security Management	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>			Smart Card				
Technology Management	<input checked="" type="radio"/>	<input type="radio"/>		<input checked="" type="radio"/>	Remote Access					

Must have     Nice to have    \* Example: Internet

**Information Technology Implications of linkages to External Constituencies**

**Examples of Linkages  
to Constituencies**

**IT Implications**

**Other Schools**

Optimal sharing of information and resources to encourage collaborative learning on a subject among schools.

**Homes / Parents**

Distance learning enables students to keep track of school work even when they are not physically in school. Parents can access the school for feedback on their children's progress.

**Community**

The Smart School can be a community centre to enable community involvement in school activities. The community can also use the Smart School as an on-going learning centre.

**Libraries**

Research, reference, and data collection resource available on-line

**Universities / Colleges**

Distance Learning on topics by experts in the field, the provision mentor / tutor programmes, and research data.

**Companies / Industries**

Access to information on industries, and career opportunities, industrial practical training and sponsorship programmes offered by these industries.

**Museums/Archives /Science Centres**

Research, reference, and data collection resource available on-line. Possible access to virtual experiences.

**Local Authorities**

On-line information about local social and cultural events to enable school participation.

therefore External Constituency Technical Requirements might look like the following...

Item \ Equipment	Stand Alone Computer	LAN	Local Server/ Database	Network Resource *	Secure Network	Regional Server/ Database	Central Server/ Database	Video Conferencing	Audio Visual	Other (specify)
Other Schools	●	●	●	●				○		
Homes / Parents	●			●						
Communities	●			●				○		
Libraries	●	●	●	●					○	
Universities / Colleges	●	●	●	●				●		
Companies / Industries	●	○	○	●				○		
Museums/Archives/ Science Centres	●	●	●	●				○	○	
Local Authorities	●			●		○	○		○	

● Must have    ○ Nice to have    \* Example: Internet

Technical requirements and possible solutions at the school level:

Requirements

**Varied & easy access to teaching-learning resources**

Physical facilities e.g classroom or lab  
Teaching and learning equipment including hardware and software

**Conferencing facilities**

Distance learning  
Meetings & in-service training

**Variety of materials**

Conventional materials  
Multimedia materials  
Network-based materials

Possible Solutions

**Classroom**

Multimedia courseware  
Presentation of teacher s educational materials (e.g. computers for students and teachers, audio/video facilities)  
Collaborative tools e.g. e-mail, groupware

**Library / Media Centre**

Database centre of multimedia courseware  
Network resources (e.g. Internet)

**Computer laboratory**

Teaching ( e.g. Computer Studies as a subject)  
Readily accessible multimedia and Audio/Video equipment

**Multimedia Development Centre**

Creation / development tools for multimedia materials (e.g. preparation of presentations or music)  
Catering for varying levels of sophistication

**Studio / Theatre**

Control room for centralised Audio/Video equipment  
Video conferencing studio  
Preview room for audio, video or laser disk (LD) materials

**Teachers Room**

Access to courseware catalogues and database  
Information and resource management systems  
Professional networking using e-mail and groupware

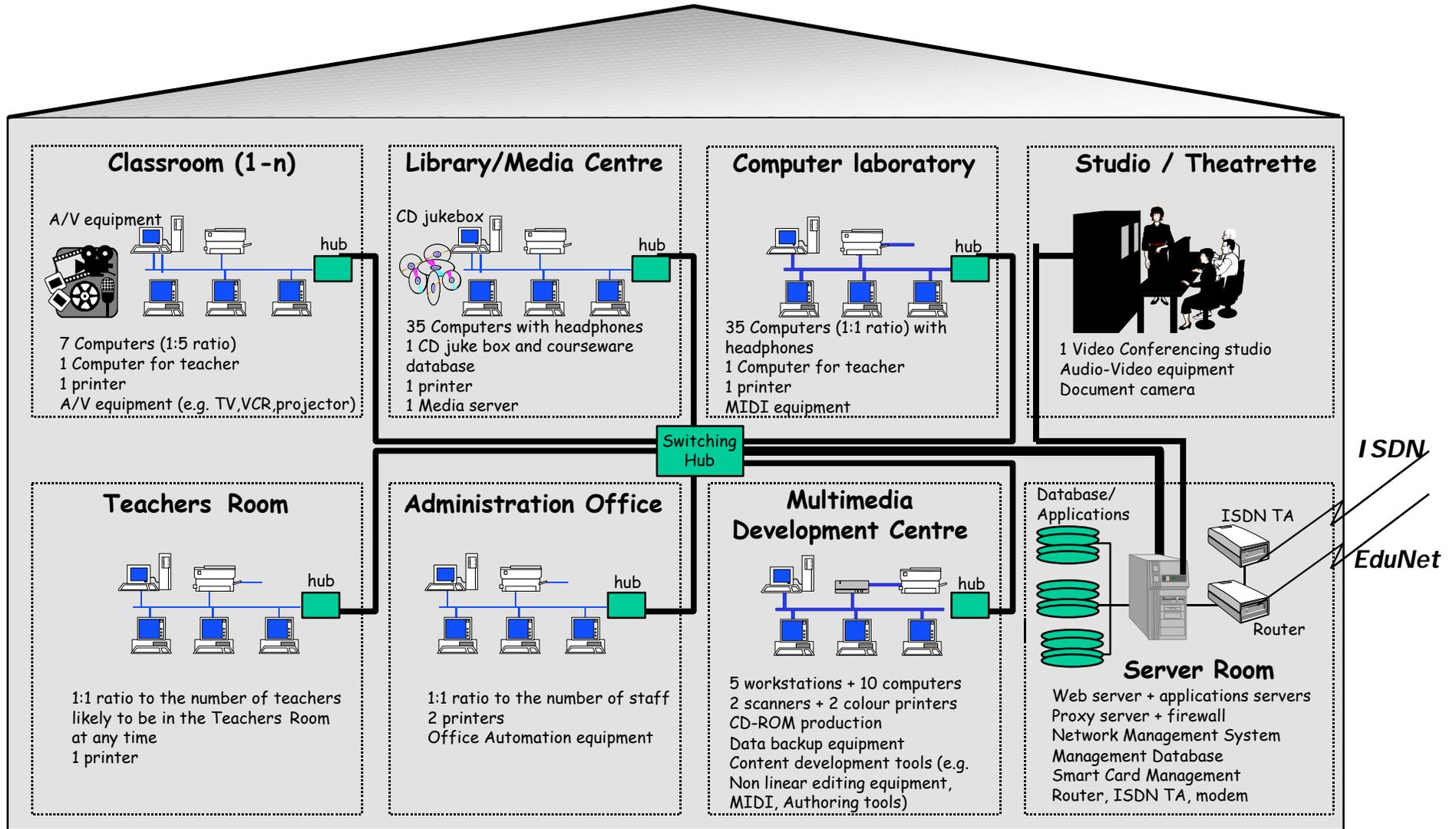
**Administration Office**

Database management of students and inventories  
Tracking (e.g. teacher and student performance, resources)  
Distribution of notices / information

**Server Room**

Central server site (e.g. Application servers, Management Database server, Web server)  
Security measures ( e.g. Proxy server, Firewall )  
Telecommunication interface and access to Network resources e.g. Internet (e.g. router, modem)

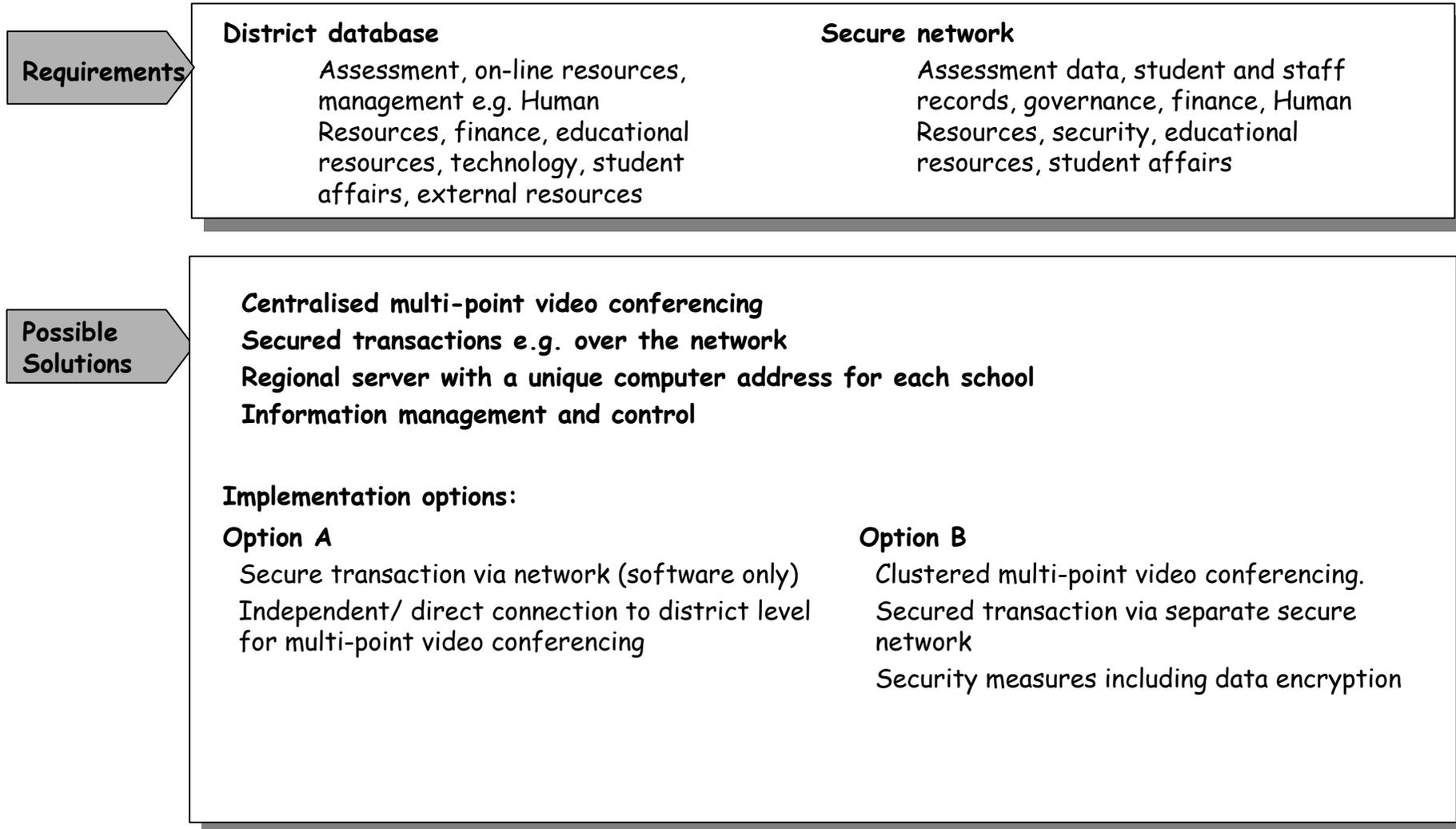
Possible scenario a school configuration



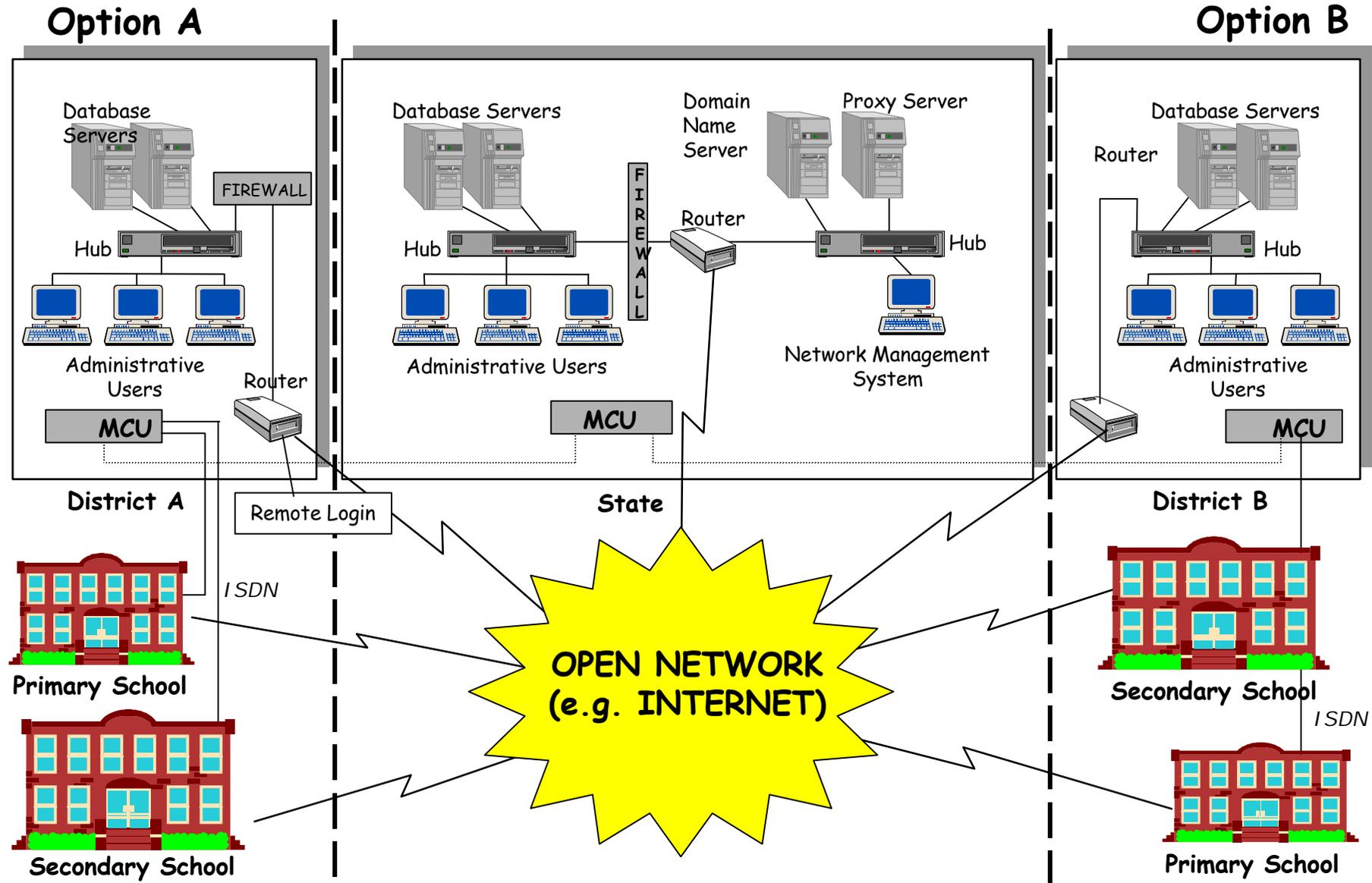
Multi-mode fibre   
 UTP Category 5

**Assumption:**  
 Classroom size: 35

Technical requirements and possible solutions at district level



Possible scenario of an inter-school and district education network



Technical requirements and possible solutions at national level

Requirements

**Access to resources over an open platform**  
**Means for collaborative work**  
**Open communication channels with constituencies**  
**Controlled distribution of sensitive information**  
**External telecommunications backbone to support widely distributed points of access**

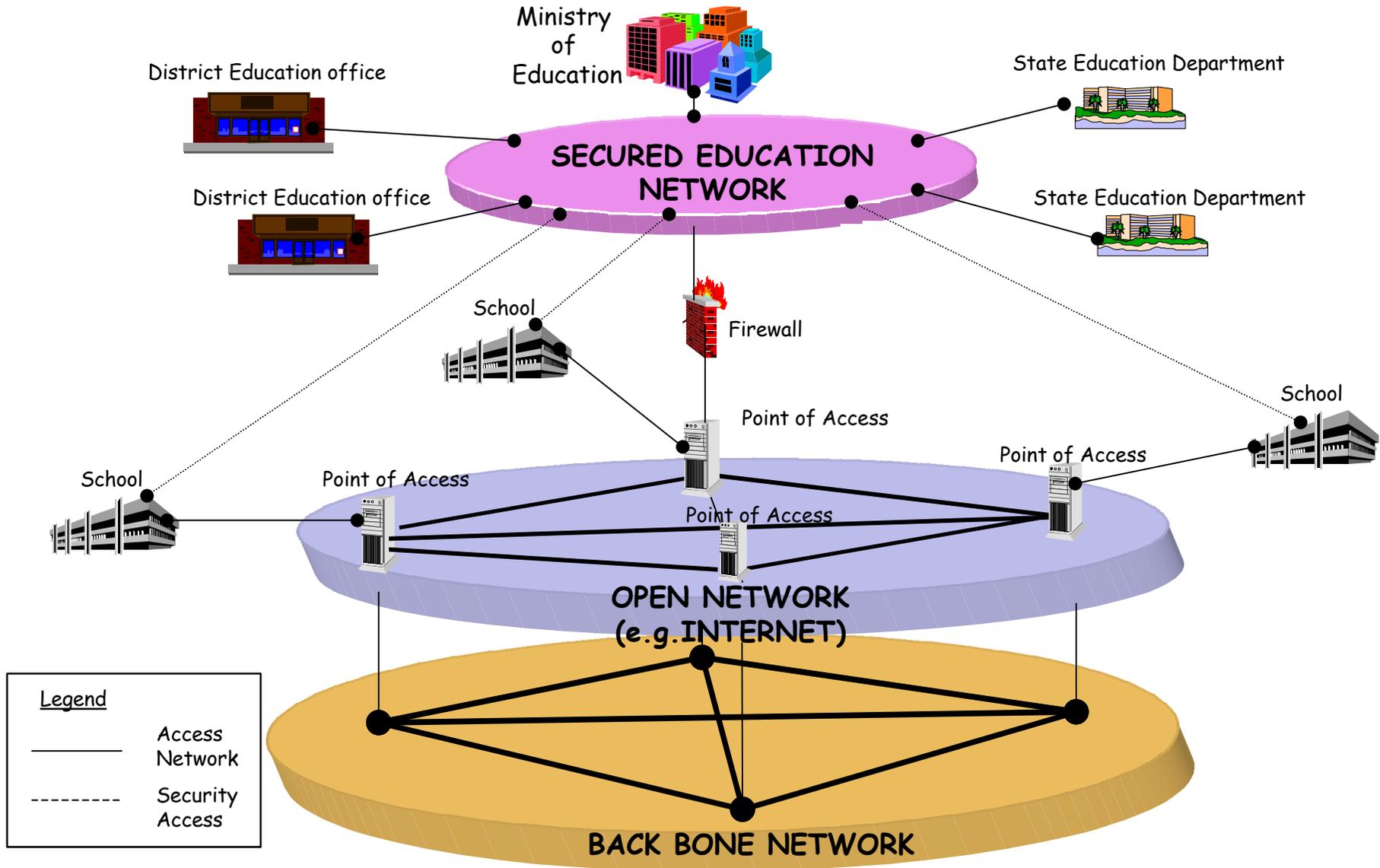
Possible Solutions

**An education network consisting of both secured and open networks**  
sensitive information rides on the secure network (Ministry of Education, State & District Education offices, etc.)  
educational resources reside on the public network (schools, libraries, etc.)

**Schools can get into the secure network**  
through the open network via encryption means & other security measures  
directly via remote access

**The telecommunications backbone can be**  
current telecommunications infrastructure  
the Multimedia Super Corridor infrastructure

Possible scenario of a national level education network



Technical requirements and possible solutions for the national repository centre

Requirements

**A national level repository centre available to all education sites**

**Expedient access to**  
the Ministry of Education  
the Federal Government administration

**Reliable telecommunications infrastructure**

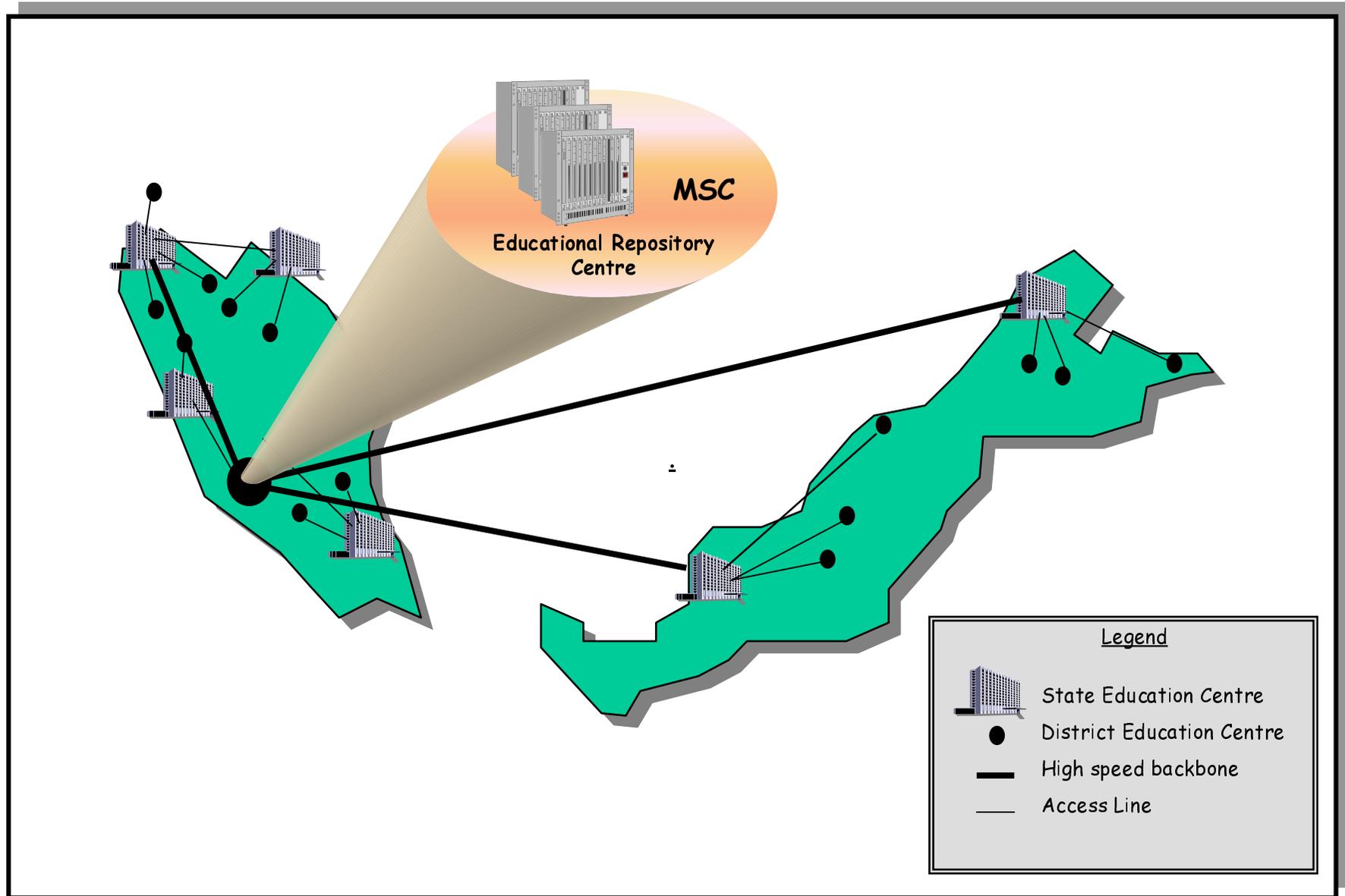
**Capacity for international linkages and connectivity to relevant repositories**

Possible Solutions

**It should reside in the Multimedia Super Corridor (MSC)**

Designated multimedia centre  
Proximity to Putra Jaya, the new Federal administration office  
MSC will have the best and guaranteed telecommunications and infrastructure facilities  
The Smart School Project is a key MSC Flagship Application

...if the national repository centre were located within the MSC...



# The Malaysian Smart School Policy Implications

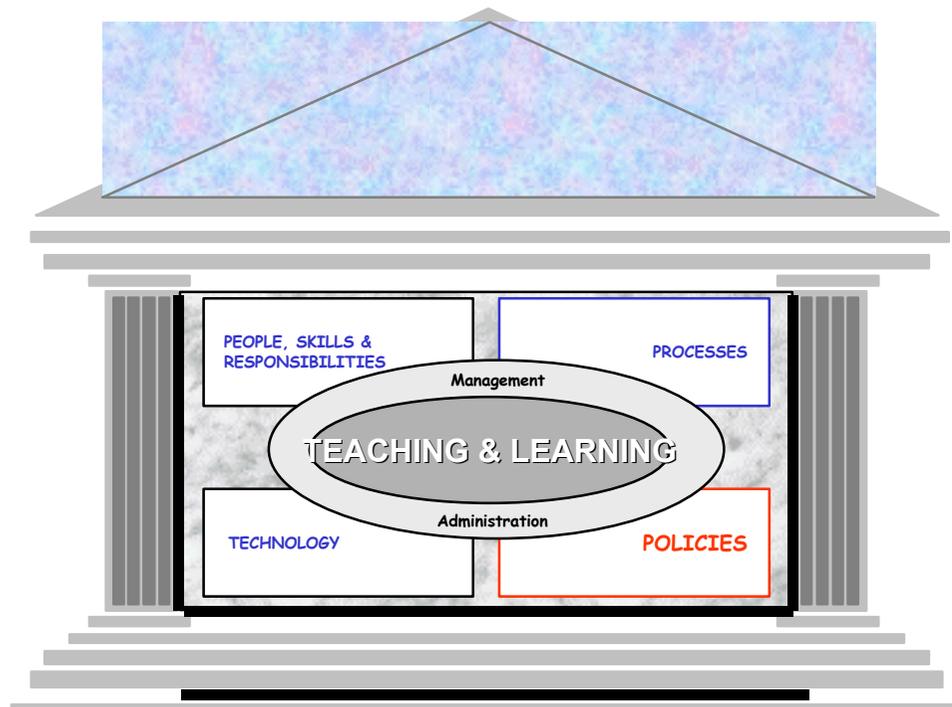
### Policy Implications for Smart School

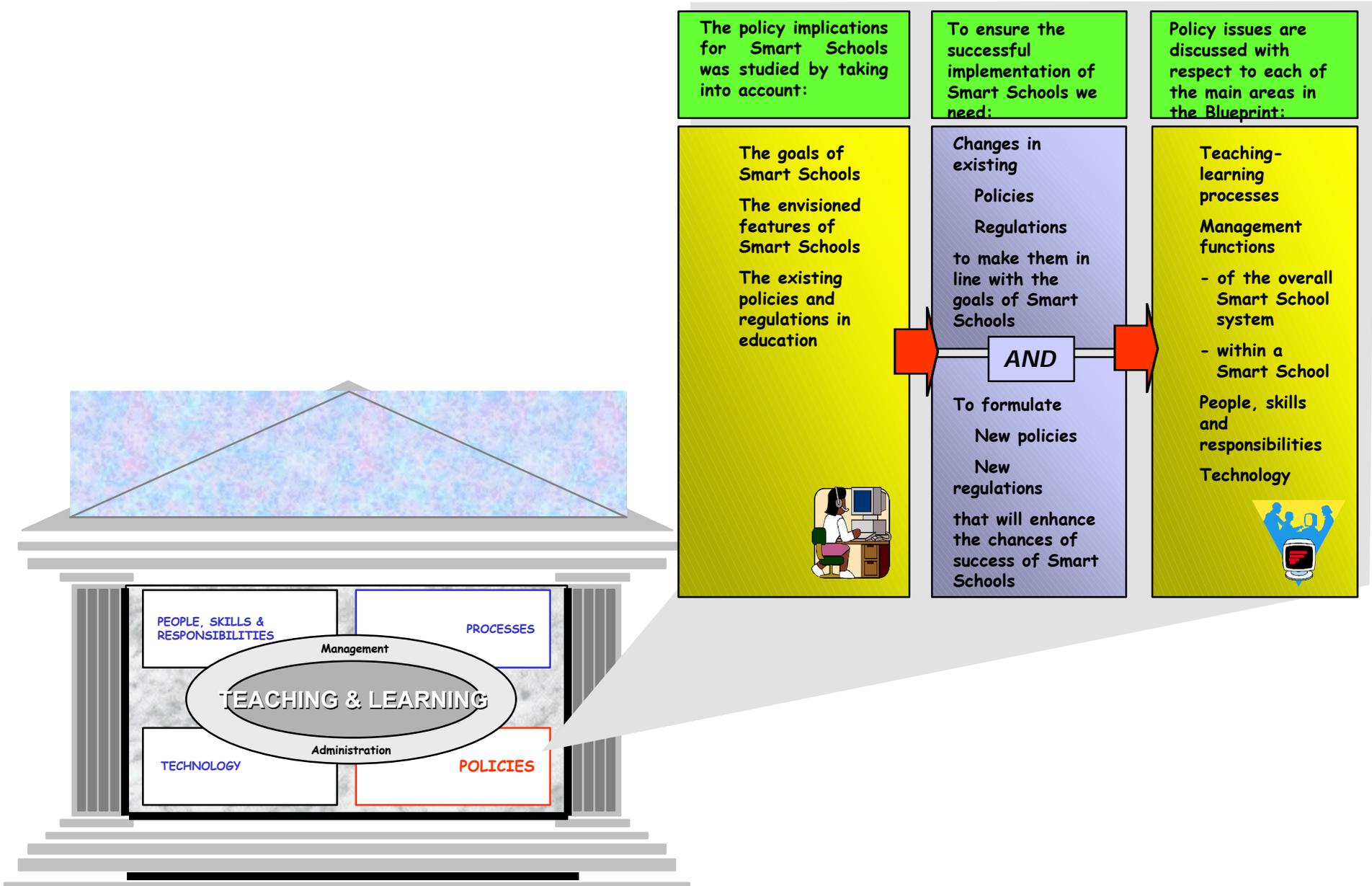
In this Section, the term policies is used as an umbrella term that encompasses both legislative policies and regulations that will influence Smart Schools and their effective implementation.

#### How to read this section

The Project Team realised that it was important to consider the whole range of policies, regulations, procedures, and practices both formal and informal, written and unwritten that will need to be changed to accommodate implementation of Smart Schools. This complex task will be undertaken by numerous departmental committees in the Ministry of Education and will require time and several iterations to arrive at specific new approaches.

Hence, as a start, in this Section, the Project Team highlighted some of the important questions at the macro level - particularly related to policies and regulations - that need to be addressed to ensure the successful implementation of Smart Schools in Malaysia.





**Policy areas that need to be addressed in the implementation of Smart Schools:**

Note: Questions that have significant policy implications are discussed under the following categories within each of the four main areas :

Teaching-Learning	Management	People, skills and responsibilities	Technology
<p>Teaching-learning Assessment Selection and approval of teaching-learning materials</p> 	<p>School governance Student affairs Educational resources External resources Financial Facilities Human resources Security Technology</p> 	<p>Teachers Administrators Technical staff Personnel in the education system that support Smart Schools implementation Parents Community</p> 	<p>Technology inputs Technology standards Data security Technology architecture</p> 

Examples of policy areas that need to be addressed in the Teaching-Learning Process

	<p><b>Envisioned Features of the Smart School</b></p>	<p><b>Questions that need to be addressed</b></p>
<p>Teaching-learning</p>	<p>Students progress at their own pace according to capabilities Students in a class learn in a variety of ways (e.g. distance learning, internet, electronic courseware) at the same time.</p>	<p>Under what conditions should vertical integration be introduced? Should there be changes in the time allocated for teaching the various subjects in the Smart School curriculum? If so, how should they change? Is there a need for more flexible time-tabling? What kind of classroom arrangement and furniture can enable learning to occur in a variety of ways?</p>
<p>Assessment</p>	<p>Aptitude assessments will be conducted at the point of school entry and then periodically after that</p>	<p>How often should aptitude assessment be conducted? How should aptitude assessments be designed? What national examinations should be conducted? What levels of recording should be done for the various assessment?</p>
<p>Selection of teaching-learning materials</p>	<p>Best courseware materials need to be identified for teaching Smart School subjects</p>	<p>What changes in the selection process of teaching-learning materials are needed to ensure best Smart School materials? (e.g. transparent selection criteria and evaluation.)</p>

Policy areas that need to be addressed in Management Functions :



Envisioned Features of the Smart School	Questions that need to be addressed
<p><b>School Governance</b></p> <p>Empowers the rapid relay of relevant information to and from all stakeholders</p> <p>Creates channels for rapid communication to the world</p>	<p>What information needs to be compiled?                      Who gets access to what information?                      Who owns it?                      How long does the information need to be kept?                      How does the information get modified?                      Who can represent the school's views?                      What are the guidelines for expressing views in e-mail form from the school?                      What regular practices should be used for outreach communication? (e.g. web-site - how often to be updated and what contents to be included?)</p>
<p><b>Student Affairs</b></p> <p>Test administration is via multiple-delivery and on-line</p>	<p>What are the conditions under which test administration is conducted (e.g. can students do the assessments from home?)</p>
<p><b>Facilities</b></p> <p>Intellectual property rights are upheld in Smart Schools                      School facilities will be used by the community after school hours</p>	<p>Who owns the written materials produced by teachers?                      What are the guidelines on copyright issues?                      How do we ensure the security of school facilities?                      How do we ensure equal access to the physical facilities?</p>
<p><b>Overall Management</b></p> <p>A central team at Ministry of Education in charge of Smart School implementation</p>	<p>Who drives the implementation?                      Who evaluates the Smart Schools?                      Who co-ordinates the external linkages (e.g. Telekom, vendors, etc.) with state, district and school levels?</p>

Policy areas that need to be addressed in getting the right people for Smart Schools :

	<b>Envisioned Features of the Smart School</b>	<b>Questions that need to be addressed</b>
<p><b>Teachers</b></p>	<p>All teachers skilled in the use of IT and integration of IT in the teaching-learning process</p>	<p>What needs to be included in the IT component of the pre-service teacher training curriculum at colleges and universities?                      What IT elements are necessary for continuous teacher development?                      What should be the minimum hours of on-going, annual professional development required for practising teachers?                      What mechanisms need to be in place to ensure the integration of IT into teaching activities?</p>
<p><b>Administrators</b></p>	<p>Administrators (principals, headmasters, senior assistants) possess adequate IT skills</p>	<p>What are the minimum IT skills necessary for school administrators?                      Should proficiency in IT skills become a criterion in the selection of administrators? If so, how?                      What mechanisms need to be in place for all administrators to acquire the necessary IT skills and then periodically update these skills?</p>

Policy areas that need to be addressed in getting the right people for Smart Schools (continued) :

	<b>Envisioned Features of the Smart School</b>	<b>Questions that need to be addressed</b>
<b>Technical Support Staff</b>	Competent technical staff provide support for technology used in Smart Schools	What new posts need to be created in schools at the district and state levels? (Are these technical positions or teachers who are trained to support technology)? To what extent would teachers and students play a role? (e.g. teachers with interest and expertise have a reduced teaching load to enable them to be responsible for technology support; students to assist in technology support as an extra curricular activity or for credit)
<b>Personnel in the MoE who support Smart School Implementation</b>	Lecturers in teacher training colleges and universities, and School Inspectors are knowledgeable about the Smart School philosophy, goals and the integral role of technology in teaching-learning	Should the envisioned features of Smart School teaching-learning and the use of technology in teaching-learning be introduced as criteria against which to select lecturers and school inspectors?

Policy areas that need to be addressed in getting the right people for Smart Schools (continued) :

	<b>Envisioned Features of the Smart School</b>	<b>Questions that need to be addressed</b>
<b>Parents</b>	Parents can easily access academic and health records of their child on-line	Who qualifies to view students data? What kind of data goes on-line?
<b>Community</b>	The Smart School is the centre of learning for the community The community is encouraged to participate in Smart School activities and use Smart School facilities	What facilities shall be made available for community use? And when should they be made available? What is the extent and type of community participation that is encouraged? (e.g. Individuals coming into the classroom as volunteer teacher aides or involved in co-curricular activities or helping students who need extra help with their school work)

Policy areas that need to be addressed when introducing technology in Smart Schools :



	Envisioned Features of the Smart School	Questions that need to be addressed
Technological Inputs	LAN, WAN hardware and courseware are common technology inputs in Smart Schools	What modifications need to be made to the per capita grant (PCG) to accommodate start-up and on-going technology expenses? What alternative funding sources can be harnessed by Smart Schools to acquire additional technology inputs?
Technology Standards	Common technology standards must be adhered to in all Smart Schools for reasons of inter-operability	To what extent are schools able to add technology that is inconsistent with agreed-upon Ministry of Education guidelines or technology standards?
Data Security	Most data in Smart Schools will be on-line and easily accessible	Who defines security policies? Who grants security access rights?
Technology Architecture	A central agency will co-ordinate the introduction of technology into Smart Schools	Who owns and modifies architecture and technology standards? How will legacy systems and networks be integrated into the Smart School system? Who is responsible for defining a technology support structure, modifying it and ensuring its success? Who is responsible for monitoring technology (hardware and software) performance over time? Who will be responsible for defining guidelines that will allow beta testing of new courseware in Smart Schools What role can the private sector play in the on-going implementation (e.g. with respect to standards, technology, architecture and policies)

# The Malaysian Smart School

# Concluding Remarks

**Concluding remarks:**

The dynamic nature of a Smart School makes it obligatory and incumbent on the Project Team to propose indicators of whether or not the key objectives of such an ideal school have been achieved.

These indicators are detailed criteria that provide clear evidence as to the extent to which the programme is succeeding in achieving the goals set out in the Malaysian National Philosophy of Education.

It is with this in mind that the Project Team feels that some of the key criteria to measure the performance or success of the Smart School programme would comprise the following:

The curriculum should be broad to cater to the needs and different capabilities of students;

There should be competent, caring and professional teachers

The school climate or culture should be one that is conducive to learning;

The on-going assessment system should be one that supports good instruction;

There should be achievement gains recorded year by year;

There should be a decrease in discipline referrals

There should be a decrease in drop out rates

There should be high level of parent and community involvement

**Concluding remarks (continued):**

To bring about these high levels of performance, the Project Team has identified critical factors for success in order for Smart Schools to be established and implemented in Malaysia. Among these factors so identified are the following:

There should be buy-in, support and commitment from all stakeholders;

There should be continuous professional development for teachers, principals, administrators and other educational personnel;

There should be sufficient funds and resources;

Policies, regulations, norms and guidelines that support Smart Schools should be in place;

There should be continuous synergistic efforts by all agencies in the educational system.

Schools should have in place processes which reflect the need for efficiency and effectiveness;

There should be sufficient deployment of IT resources for enabling support including on-going maintenance and support.

The Project Team also proposes that an oversight mechanism be set up to monitor and assess the implementation of Smart Schools and to oversee the balance of rights and responsibilities among the constituencies of the Smart School system.

With all these prerequisites and conditions in place, the Project Team is convinced that Smart Schools will herald a new and dynamic phase in the nations educational development, providing a key ingredient in Malaysia's march towards being a fully developed nation by the year 2020.

# The Malaysian Smart School

## Appendix 1 Smart Schools In Malaysia: A Quantum Leap

Ministry of Education, Malaysia  
Kuala Lumpur  
January 1997

## SMART SCHOOLS IN MALAYSIA : A Quantum Leap

Malaysia needs to make the critical transition from an industrial economy to a leader in the Information Age. In order to make this vision a reality, Malaysians need to make a fundamental shift towards a more technologically literate, thinking work force, able to perform in a global work environment and use the tools available in the Information Age. To make this shift, the education system must undergo a radical transformation. The schooling culture must be transformed from one that is memory-based to one that is informed, thinking, creative and caring, through leading-edge technology. It is against this background that Smart Schools has been made one of the flagship applications in the Multimedia Super Corridor (MSC). Smart Schools is therefore no longer a fashionable luxury but the only way forward.

By the year 2010, all the approximately ten thousand Malaysian schools will be Smart Schools. In these schools, learning will be self-directed, individually-paced, continuous and reflective. This will be made possible through the provision of multimedia technology and world-wide networking. With these facilities, learning will shift from being teacher-centred to student-centred, supported by a flexible and open-ended curriculum.

Smart Schools will lead to the full democratisation of education. These schools are not for the smartest students but really a smart way of ensuring that every

student - strong or weak, rich or poor - stretches to his fullest potential in a way that is best suited to his learning pace and style. The curriculum will therefore recognise that students have different learning needs. Computer technology will allow for this flexibility and diversity to be built into the system. This will also narrow the opportunity gap between the affluent who can afford advanced technology in their homes and the less affluent in society.

### KEY PLAYERS IN SMART SCHOOLS

#### Students as Active Learners

Smart Schools will prepare students to make a successful transition to the modern and more global environment. The schools will nurture skills of creative problem-solving in the face of novel situations, and students will learn to exercise courage in making decisions and assuming responsibility for them. Students will learn to process and manipulate information. They will be trained to think critically and to reflect on what they have learned, as well as to transfer and apply knowledge from one discipline to another and to daily life.

Students will be able to go on an information journey around the world to search for and collect data. Besides having their own access to on-site resources, they will

## SMART SCHOOLS IN MALAYSIA : A Quantum Leap (continued)

also have access to national as well as global resource centres, through tools such as the Internet. In addition to gaining access to databases, networking will enable interactions with other students, teachers and people all over the world. The students world will be widened through these scholastic and social contacts.

Networking will have the added advantage of allowing those who are unable to attend school, for any reason, to carry on with schoolwork from their homes. This gives new meaning to the idea of absenteeism from school, as learning can continue uninterrupted outside of the school walls.

Hence, students will need to be taught strategies to competently and selectively navigate for information. In addition, team effort, group collaboration, flexibility, farsightedness and competency in international languages will be emphasised.

The Malaysian Smart Schools will also incorporate the innovative concept of the virtual express class. The current system stretches the weak students and restricts the smartest. In the Smart Schools, technology will help provide the flexibility to remove this stress in the system. This will allow fast learners to complete all coursework and assessments sooner than the normal duration.

The less able will undergo a thinner programme and proceed at a slower pace as well as be able to get more focused attention from the teacher. This will be made possible with the establishment of centralised on-line delivery of assessment items. The flexible assessment system will allow students in a physical class to work at different levels in the same subject as well as to allow a student to progress to different levels of different subjects at any given time. With this, the slow learners who are often forgotten will be guaranteed the attention they deserve.

### Teachers as Facilitators of Learning

Teachers will now play the role of a guide on the side, thus doing away with their traditional role of the sage on the stage. Teachers will identify goals, define direction for their students, pilot their progress towards these goals and then step back to allow the students to learn at their own pace. They will give psychological support and encouragement. They will periodically step in to check progress, applaud strengths and efforts, identify weaknesses, and decide what kind of practice their students will need. In short, teachers will be instrumental in creating conditions that will promote self-directed learning which is creative and independent.

## SMART SCHOOLS IN MALAYSIA : A Quantum Leap (continued)

Students in Smart Schools will therefore have the advantage of more personalised attention from their teachers. Computers will allow teachers to delegate routine exercises or delivery of information, and free them from the more mundane administrative tasks to concentrate on the human facet of education. The time made available can then be utilised to mould students to become good citizens with a sense of history, traditions and values.

### Administrators as Effective Managers

The third pillar of the Smart Schools will be the streamlining of school administration through the use of technology. This will help improve efficiency, remove redundancies and radically improve access to all concerned. With school management computerised and on-line, the principals will be able to plan, manage and utilise both human and physical resources effectively.

Networking will facilitate the involvement of parents and the community in school programmes, making them effective partners in their childrens education. With databases, information on students and teachers will be readily accessible to legitimate parties. Students and teachers welfare needs can be more effectively met with constant monitoring. Furthermore, systematic

monitoring of students progress will alert the school as to when interventions are necessary for both the gifted and less able.

A vision of a day in the life of a student, teacher, principal and parent for the Smart School is in the Appendix.

### IMPLEMENTATION OF SMART SCHOOLS

A total of 85 schools involving 85,000 students will be operationalised as Smart Schools in January 1999. By the year 2000, approximately 300,000 students in about 500 schools will join the move to become Smart Schools.

By the year 2010, all the 10,000 schools in the country will be Smart Schools. This will involve an estimated enrolment of 5.8 million students and 450,000 teachers.

This has significant implications particularly on multimedia infrastructure deployment, training and materials development.

### Multimedia Infrastructure

Smart Schools invariably demand a heavy investment on multimedia infrastructure. The hardware would include computers and peripherals, video and voice conferencing equipment and the backbone telecommunication infrastructure.

## SMART SCHOOLS IN MALAYSIA : A Quantum Leap (continued)

The software will comprise word processors, spreadsheets, networking software, e-mail software, Internet browsers, authoring tools and training software. In addition, Smart Schools will require the creation of interlinked national and local databases and resource centres.

The infrastructure is not incremental to the current information technology deployment but orders of magnitude higher. The successful planning, procurement, installation and maintenance will require a radical change in approach. This is essential to ensure the optimum utilisation of the facilities, which otherwise could easily become an expensive high-tech means of doing more of the same.

### Training

The most crucial aspect of training would be teacher training. There needs to be a careful mix of intensive training and counselling to help teachers adapt to the new environment. This will be critical in order to dispel the natural insecurity and fears of redundancy that will arise from this radical paradigm shift in teaching methodology and hence the very role of teachers.

This training will have to devote considerable attention to changing the mindset of teachers to understand that Smart Schools must provide the best environment for self-paced, self-directed, and self-accessed learning.

Initial training will be provided for 6,000 teachers for the implementation of Smart Schools in 1999. By the year 2005, another 70,000 teachers will have to be trained. The full implementation of Smart Schools throughout the country will require the training of about 450,000 teachers by the year 2010.

This would involve thoroughly revamping training programmes, significant additional infrastructure and the mobilisation of expertise, both local and foreign.

While teachers form the largest target group for training, the challenge to train administrators, supervisors, technologists and supporting staff is not insignificant.

### Materials

There is a need to make available a rapid and sustainable supply of courseware in the next year or two, and to have these constantly replenished and updated. Courseware

## SMART SCHOOLS IN MALAYSIA : A Quantum Leap (continued)

has to be developed for all subjects in the curriculum and to cater for the high fliers, the average and the slow learners. In this respect, perhaps the greatest challenge will be to prepare courseware for the slow learners.

This courseware will need to exhibit the following features : discrete self-contained packages, interactive, cognitively challenging, with self-assessment and built-in checkpoints for teachers inputs.

### The Challenges Ahead

To enable the smooth transition to Smart Schools, some policy changes will be necessary. These would encompass schooling structure, training and personnel requirement and certification conditions.

Additionally, the Ministry of Education realises that it has to bring in leading-edge thinking and knowledge on Smart Schools to find the most practical solutions to the complex tasks inherent. To develop and fund this ambitious project, it will have to form smart partnerships with leading private companies, not only for the implementation but also for the conceptual design phase.

Effective implementation of Smart Schools will require funding for the building of new schools with all its multimedia infrastructure, upgrading facilities in existing schools and teacher training institutions, and for the maintenance of new technology introduced. Over the duration of the project, this will require several billion Ringgit Malaysia (RM). While the dramatic increase in budgetary allocation is necessary, it is unlikely that it will be sufficient to fund this mega-project. Innovative methods such as private sector funding, corporate and community involvement and sponsorships and smart use of the excellent infrastructure after school hours, will need to be explored.

\* \* \*

*Smart Schools will provide a golden opportunity for the Ministry of Education to implement innovations to achieve the highest standards in education and become a global leader in the field.*

*Obviously there is a need to learn from successful existing and ongoing projects around the world and then merge this learning with unique local requirements to create something that is beyond and more advanced.*

*The challenge ahead is a great one, but the rewards will be just as great.*

## SMART SCHOOLS IN MALAYSIA : Scenarios

### *Scenes From A Day In The Life Of A Primary School Student*

My name is Farah. I am a Year 3 primary school student. My friends and I came to school early this morning to update our school's home page on the World Wide Web. We also replied to some students in Leningrad who asked about the kind of clothes Malaysian students wear.

Later in the morning, during our Humanities class, we learned about other cultures by exchanging e-mail over the Internet with students in different parts of the world. My teacher, Mr. Shah, said we should save our e-mail messages and prepare portfolios of our learning to share with students in the other classes. He also said that we could discuss our portfolios with him, among ourselves, and even with our parents, brothers, and sisters. I am going to ask my parents to look over my portfolio before I submit it to Mr. Shah.

Today, we worked on different modules for Science. Half of my class decided to study the same Science module with Mr. Kalis' guidance. First, he made sure that everybody in the class had a module to study, whether alone or in a group.

Then, he joined my study group and asked us how we would explain to a visiting alien from another planet when it/he/she (?) asks "How does a tree grow?". He let us watch a film using time-lapse photography to show us how a seed grows into a tree in the forest.

It was the most amazing thing we had ever seen. Imagine a little seed growing into a huge *angsana*! My friends and I then thought of some appropriate answers to that visiting alien's question. We presented our answers in the form of a song, a poem, a creative movement, a drawing, and a dialogue.

While we were busy with our fifth level module, my good friends, Nur and Lisa were studying more advanced modules on their own. Three of my other classmates did a group study of "the effects of insecticides on household plants and crop plants". They will be ready to sit for their ninth level assessment soon, I think.

**SMART SCHOOLS IN MALAYSIA : Scenarios (continued)**

Last week, Miss Azah, our Music teacher, taught us how to produce sounds by using household utensils and tools. She also showed us how our bodies can produce sounds, for example, when we hum, stamp our feet, clap our hands, snap our fingers, thump our thighs! Today, we put together many different sounds to compose a piece of music that we named "Music of Sounds." Then, Miss Azah helped us record the music for our discograph collection to be put into our Music portfolio. After that, Miss Azah gave us a short quiz before assigning different modules for us to study. Six of us were given tenth level modules, but most of my friends were given seventh level modules. Miss Azah asked two of my classmates to go through another sixth level module with her.

When my parents picked me up from school, I had so much to tell them. Mother said Mr. Bakar, my class teacher, had e-mailed my monthly progress report to our home earlier in the day. She said she was glad I was enjoying school so much. Father, as usual, smiled in his quiet way to let me know he was pleased with my progress in school. I can't wait to go to school tomorrow to tell my friends how happy my parents are!

***Scenes From A Day In The Life Of A Secondary School Student***

My name is Desa. I am a Form 4 secondary school student. This morning, I came to school early to get ready for my mid-year physical fitness assessment in the gymnasium. My friends and I worked in pairs to assess our cardiorespiratory endurance, muscular endurance, muscular strength, flexibility, and body composition. After the assessment, we received computer printouts of our results. Then, we had a discussion with our Physical Education teacher about our individual physical fitness programmes for the next month. We are going to write up diets for ourselves based on information accessed from a website regarding diets and nutrition.

My friend, Imran, could not come to school today because he had sprained his foot, and his doctor wanted him to rest at home. My form teacher told us that Imran's injury did not stop him from completing his assignment at home and sending it by e-mail to school.

Today, for Humanities class, ten of my classmates chose to work on more advanced individualised tasks, while most of my classmates preferred to study the "Modern Communications" module with our teacher's guidance.

## SMART SCHOOLS IN MALAYSIA : Scenarios (continued)

I chose to help manage the school radio station for two hours. First thing in the morning was a message from our Principal, Mr. Ali. Then, some students from the lower forms played a selection of fusion music featuring the use of two traditional Malay percussion instruments, the *gamelan* and *caklempong*, in Mozart pieces. I also helped present commentaries on important events in the life of the school.

During the Biology class, my classmates picked different modules based on our interests and according to our weekly progress in Biology. My study group learned about infectious diseases as we used the Internet to track an outbreak of the Ebola virus in Africa. Last week, I learned about rates, ratios, and proportions, and worked out a computer simulation to predict the worst case scenario as well as the best case scenario of the consequences of a similar outbreak in Malaysia. Today, my friends and I used what we have learnt earlier to track the spread of HIV infection and AIDS in Malaysia, and to predict the consequences. Tomorrow, we will be talking to a panel of experts from the Malaysian AIDS Council. Mrs. Mohan, our Science teacher and Miss Lee, our Humanities teacher, had arranged the talk. That means our Biology and Humanities classes will be integrated tomorrow. My friends tell me that a doctor, a lawyer, a teacher, and an HIV positive patient would be

on that panel. I am looking forward to the discussion.

Tonight, I must prepare some questions to ask them tomorrow. Perhaps my parents who are very concerned about the spread of HIV/AIDS will help me formulate some questions.

During lunch break, my friend, Kim told me that she used the Internet to collect information about the health of the Straits of Malacca. Yesterday, she had studied the module on how to identify problems and solve them using the matrix problem-solving method. Today, she used that method to identify and resolve pollution problems in the Straits. Kim is particularly excited because her findings will be published on our school home page.

### *Scenes From A Day In The Life Of A Teacher*

My name is Johan and I teach in a Smart School. Today, as usual, I used my smart card to register my attendance when I entered the school. When the school bell rang, I checked my students' attendance from the computer in the Teachers' Room. All my students were present, so I did not have to telephone or e-mail any parents to enquire about their children.

## SMART SCHOOLS IN MALAYSIA : Scenarios (continued)

In the morning, I went over to the Teachers' Resource Centre to review this week's assessment records of my students' progress. My students had made their suggestions for the assignments and tasks that they should work on the following week. I recorded my agreement for most, and added my suggestions for some. One of my colleagues told me that a few of my students might be spending too much time on their Science projects, and not enough time on their other assignments. I spoke to the boys concerned and they promised they would spend extra time on their other assignments once they had finished their Science project.

One of my students, Lili, had not been able to finish her earlier assignment because she had been ill, and she wanted to negotiate a learning contract with me to do twice the number of assignments to make up. After some discussion about schedules and resource materials, we decided on the substance of the contract. Lili's mother had called me the day before to discuss her child's progress; after the contract had been signed, I e-mailed a copy to her and included some suggestions on how she could help her daughter. I am so glad that technology has freed me to spend more time on my students, to get to know them well, and to understand their concerns, hopes, and dreams.

Just before the second break of the day, my English class communicated via the Internet with authors of children's books. The students spent about an hour "talking" to some fifteen authors, asking questions that they had prepared yesterday. After I had graded their learning portfolios using a scoring rubric, I went to the Teachers' Resource Centre to scan my students' portfolios for transmission to the Assessment Collation Unit in the Examination Syndicate.

As I was walking to the canteen for my lunch break today, I noticed Miss Rosy's Science class in the Computer laboratory learning astronomy by accessing NASA's Internet site. One study group had even managed to get on a chat site with some former astronauts and astronomers.

After school, some of my colleagues and I met in the Teachers' Resource Centre to use the Internet to gather, analyse, and use information from libraries and universities around the world to develop data bases for teachers and students. I have been developing a data base of twentieth century children's plays. Another group of my colleagues was there too, producing Contract Activity Packages with the help of their counterparts in other parts of the world. They were hard at work producing an interactive package on "A Journey Through

## SMART SCHOOLS IN MALAYSIA : Scenarios (continued)

The Solar System," incorporating the use of computer simulation and virtual reality. When I left to go home, some Mathematics teachers arrived to prepare embedded data videodiscs for the teaching of thinking skills in Mathematics.

### *Scenes From A Day In The Life Of A Principal*

My name is Ali. I am the principal of a Smart School. Today, I started my day with a visit to the school's mini zoo, to say 'hello' to the orphaned baby crocodile that had been brought in the day before by the villagers. I had already sent an e-mail to the National Zoo, and the director had promised to send a team of veterinarians and zoo wardens to transport the orphan to the zoo later in the week. My team of technicians was already there, setting up the equipment to videotape the little creature's habits for my students to study later on. After spending a few minutes with my favourite zoo friend, a beautiful Sarawak hornbill, I walked over to my office.

Mr. Lim, the Assistant Principal, was busy arranging his schedule so that he could supervise the classes that did not have teachers for the day. Two of my teachers had

been selected to attend a thinking skills seminar, and they were not able to attend to their students. Later in the day, Mr. Lim told me the students in the affected classes were busy working on their assignments every time he checked on them, and he was very pleased with their diligence and discipline.

After I had checked the students' and teachers' attendance on my office computer, I telephoned Mr. and Mrs. Jaya to remind them of their appointment with the students in the Humanities and Science classes. Mr. and Mrs. Jaya are active members of the Careers Advisory Committee of the Parents-Teachers Association; Mr. Jaya had agreed to be interviewed by some students regarding his career as one of Malaysia's astronauts, and Mrs. Jaya had volunteered to talk about her job as a genetic engineer.

During the first break of the day, I joined a group of students in the school radio station who were responsible for the broadcasts of the day. I addressed the school over the public address system, and congratulated the class who had won a national award for their environmental project on lowland swamps. I also praised the Form 2 students for the good work they had done cheering up the senior citizens at the old folks' home yesterday.

## SMART SCHOOLS IN MALAYSIA : Scenarios (continued)

On my way to the Language laboratory to observe my teachers at work, the school clerk paged me to let me know that the videoconferencing setup was ready, and to remind me of my monthly Administrators' Meeting with the Director-General of Education in an hour's time. After discussing the purchase of some new courseware with my Language teachers, I went back to my office for my meeting. The meeting started off with the Director-General's briefing regarding the use of virtual reality to make the learning experience more effective and more vivid. My colleagues from all over the country were really excited about the new technology, and the discussion became very lively. I was able to contribute to the discussion because my eldest son had helped in the preparation of virtual reality games during his training stint with the National Science Centre.

### *Scenes From A Day In The Life of A Parent Of A Smart School Student*

My name is Madam Yasmin. My son, Desa is a student in a secondary Smart School. This morning, before he left early for school, Desa told me that he was really interested in distance running and would like to seriously train to be a distance runner. In fact, his teacher,

Mr. Zamrus, had earlier told my husband and I that our son had the potential and the mental drive to be a really good distance runner. I agreed to discuss a physical training and dietary programme with his teacher as soon as possible. I received an e-mail from Mr. Zamrus, with some suggestions for Desa's training programme. I replied to his e-mail, and we agreed that my husband and I would support Mr. Zamrus' school programme. I checked out the website that he had suggested, and I got some very good ideas on working out a suitable diet to support Desa's training programme. I forwarded my e-mail discussions with Mr. Zamrus to my husband at his workplace, and he e-mailed his support almost immediately.

Late last year, my husband and I had volunteered to serve on the fund-raising committee for Desa's school. The school needed some funds to set up a creche for the teachers' very young children, and a daycare centre for the older children. We had sent out appeal letters over the e-mail to several companies, and late this morning, some of them replied saying they would be happy to contribute building materials, manpower, and cash. We had happily forwarded all offers to Desa's Principal, and he was also very pleased to inform us that he had received offers from some non-working parents to help out in the creche and daycare centre.

## SMART SCHOOLS IN MALAYSIA : Scenarios (continued)

Last week, after a Parents-Teacher Association meeting at Desa's school, a few parents, my husband and I got together to help Desa's Principal and his staff develop a data base of resource persons, including parents so that the school could set up a more effective career guidance programme. Dr. Abu offered to collate the information and give the diskette to Desa's Principal by this week. This afternoon, Dr. Abu telephoned me to say that the information had been forwarded to the Principal. He said the first career guidance seminar was scheduled for next week, and he had volunteered me and himself as panel speakers. I agreed to help since I am passionately devoted to promoting veterinary science as a career for bright, caring, young men and women. Dr Abu would, of course, speak about the joys, trials, and tribulations of a general practitioner's life.

After dinner, Desa, my husband and I visited our favourite bookstore to buy a "library" of 7000 books; actually, it was a CD-ROM that Desa had heard about from his library teacher in school. My husband and I were amazed that technology has become so advanced. We checked out the "books" contained in the CD-ROM, and decided they were suitable for Desa, and us as well.

### *A Vision of The Physical and Multimedia Infrastructure*

The Smart School will contain a web of connections linking classrooms to one another and linking the school to other schools of the country through the use of local and wide area networks (LAN and WAN).

A primary Smart School will be equipped with computers to the ratio of one computer to four students. Each classroom will have three computers, and each of the three computer labs will have thirty computers each. There will be six multi-purpose rooms with six computers each. The electronic resource centre will house ten computers. Teachers will enjoy a ratio of one computer to five teachers. Four computers will be placed in the administrative office. All the computers will be connected to WAN.

A secondary Smart School will have a ratio of one computer to three students. Each classroom will have four computers, and each of the four computer labs will have thirty computers. The six multi-purpose rooms will have seven computers each. The electronic resource centre will house ten computers. Teachers will enjoy a ratio of one computer to five teachers. The total number of computers for administrative use will be eight. Computers in the science laboratories will be stand-alone while all other computers will be connected to WAN.

# The Malaysian Smart School

## Appendix 2

### Golden Rules for Smart School

### Project Team

### Golden Rules Adopted for the Smart Schools Project Team

All participants use the opportunity to create visionary solutions for the benefit to Malaysia, not opportunistic quick-fixes .

The team strives to fulfil high aspirations in developing leading concepts and comprehensive standards.

Team members work collaboratively to develop world class solutions to the benefit of all participants.

The project team will create end products and solutions that are acceptable to the entire team.

The Steering Committee provides guidance, not decisions between competing vendor concepts.

Open communication within the team but external communication through the Steering Committee only.

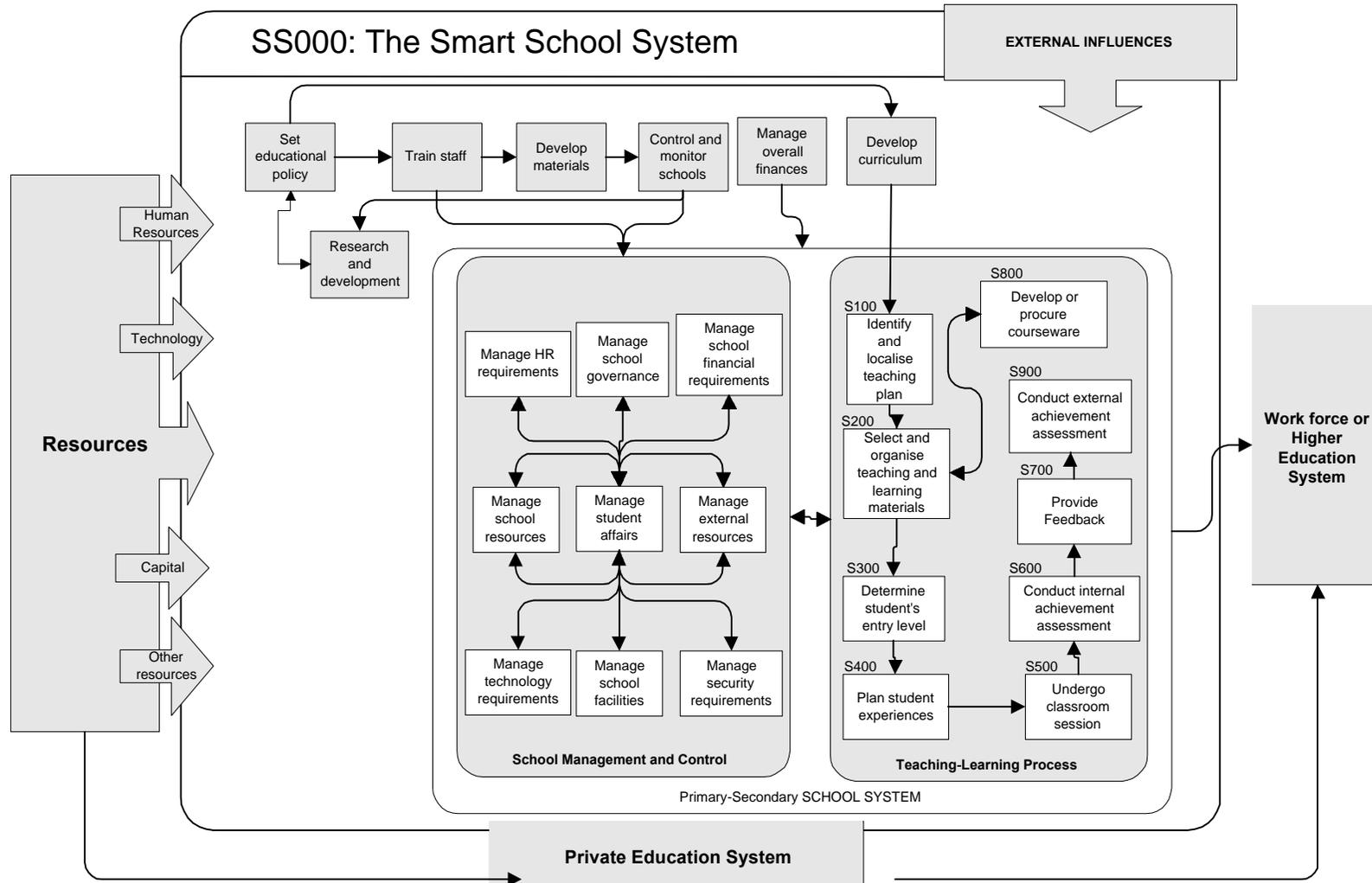
All team members contribute substantially.

Ministry of Education has the rights to the end products of the team within Malaysia; team members are encouraged to use all know-how and information acquired during the project, outside Malaysia, if not marked or identified as confidential. The Steering Committee can, however, release confidential materials for use outside of Malaysia.

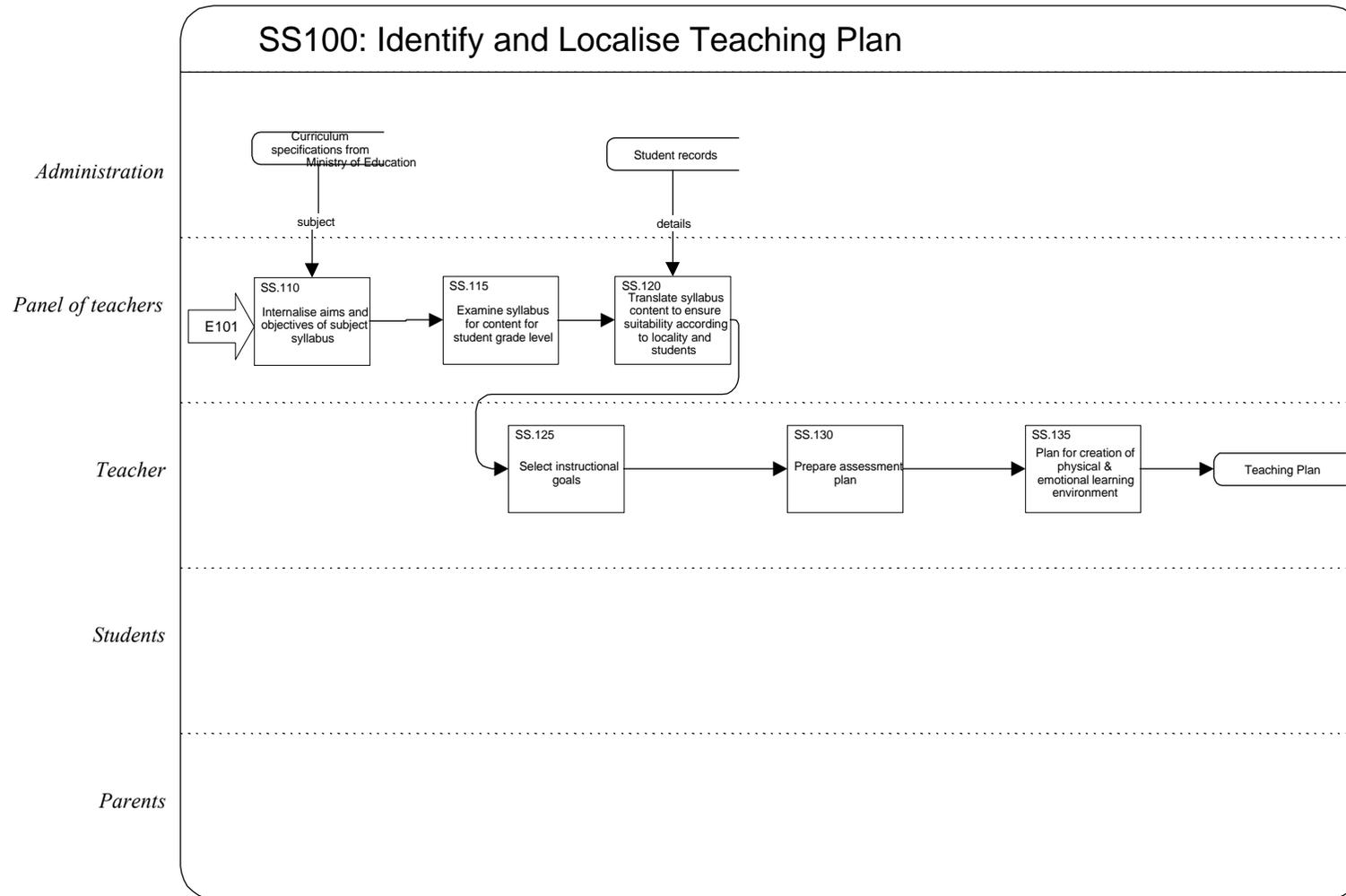
# The Malaysian Smart School

## Appendix 3 Detailed Smart School Process Flows

Process Flow Diagram of Smart School

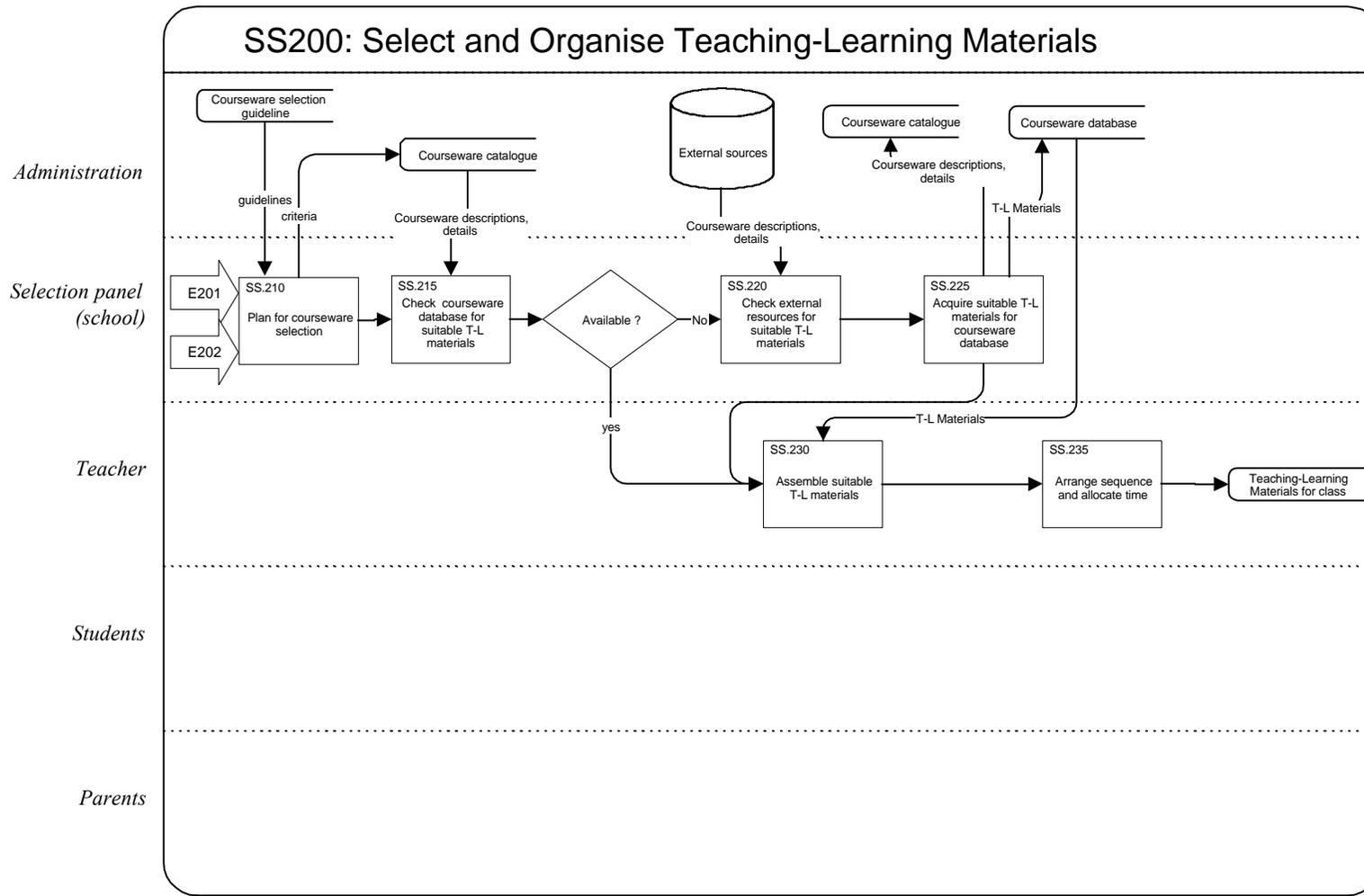


Process Flow Diagram of Smart School (continued)



**Supported Events**  
E101: Year End Planning

Process Flow Diagram of Smart School (continued)

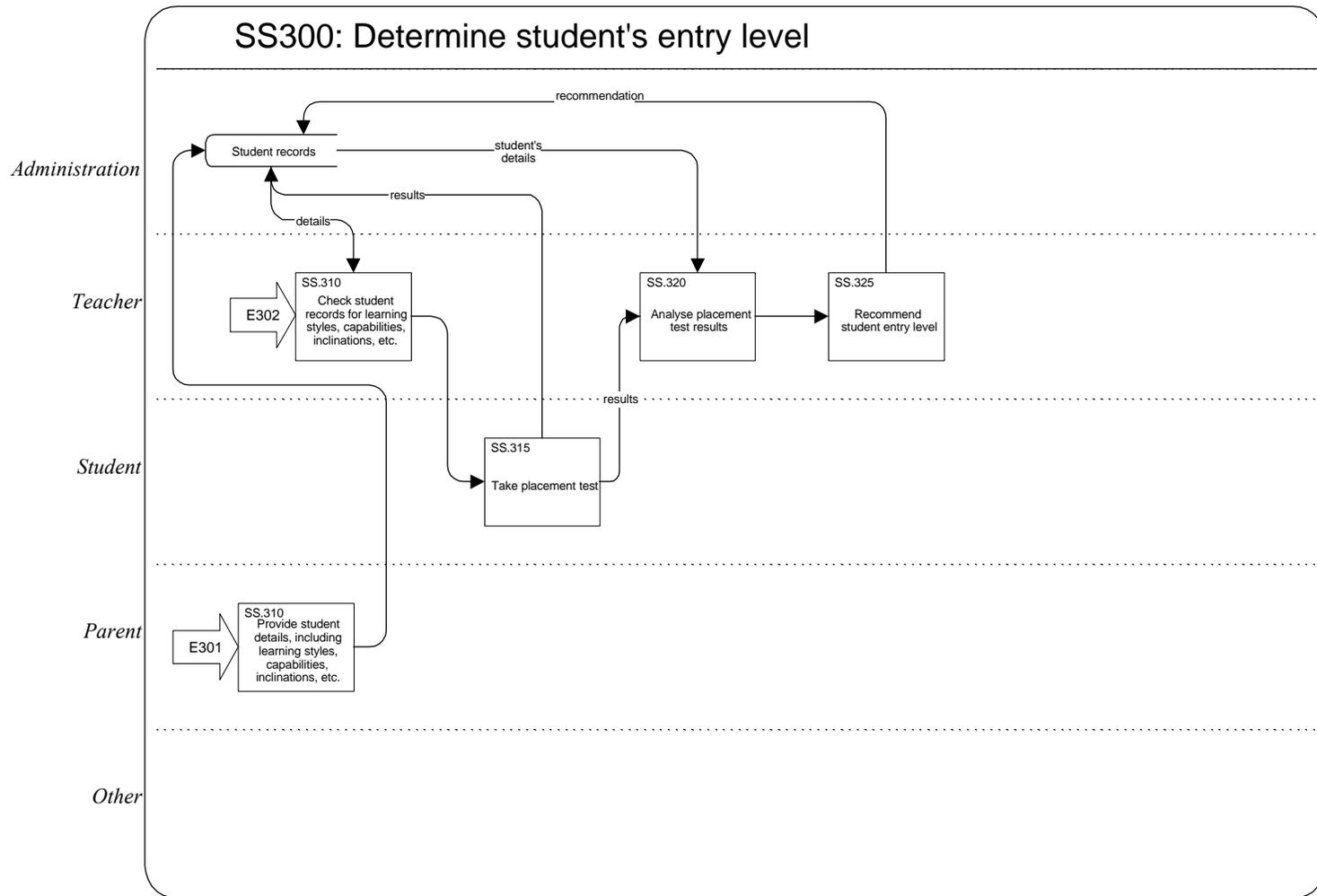


**Supported Events**

E201: Year End Planning

E202: New Materials become available

Process Flow Diagram of Smart School (continued)

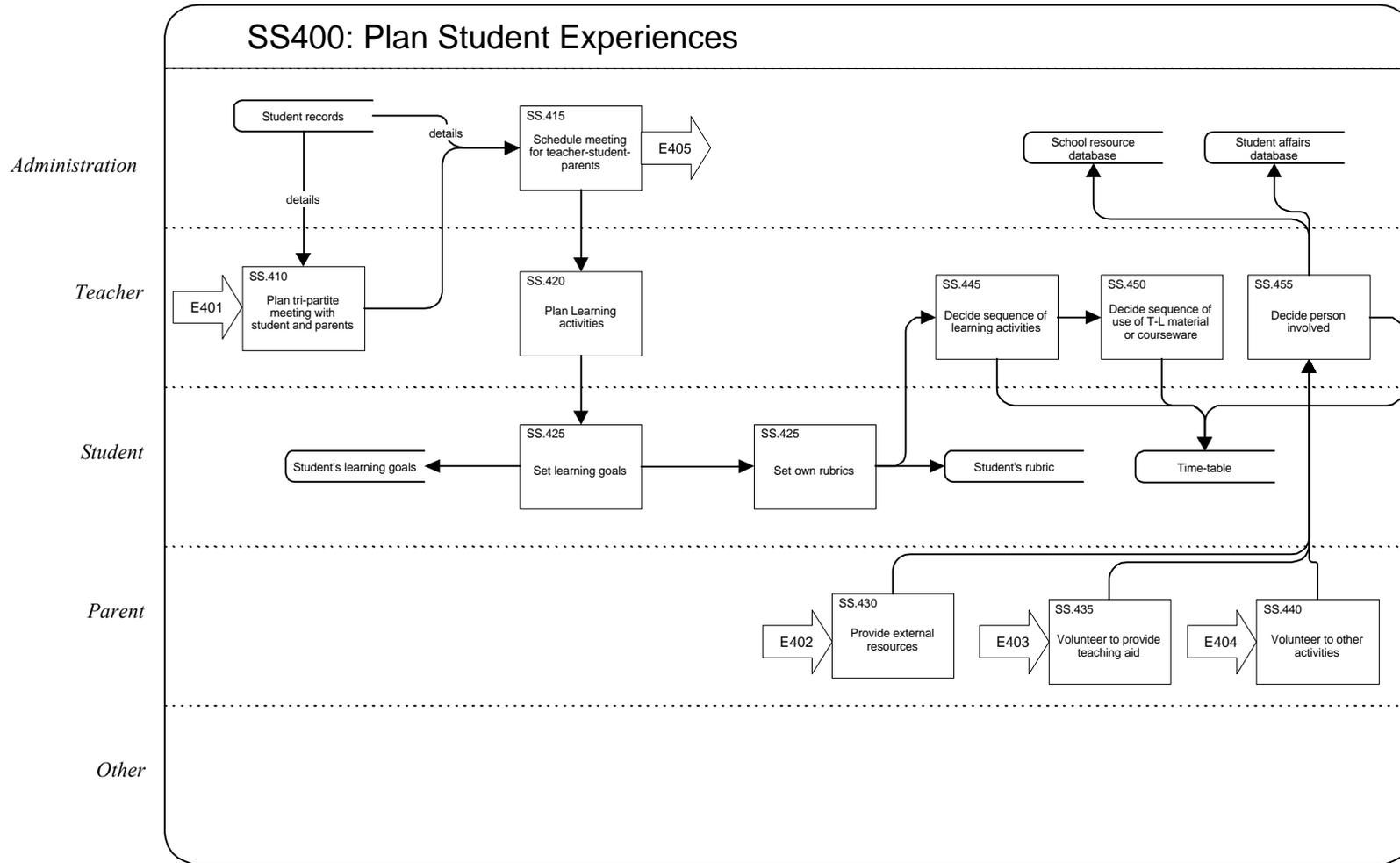


**Supported Events**

E301: Registration for new student, or update of current student

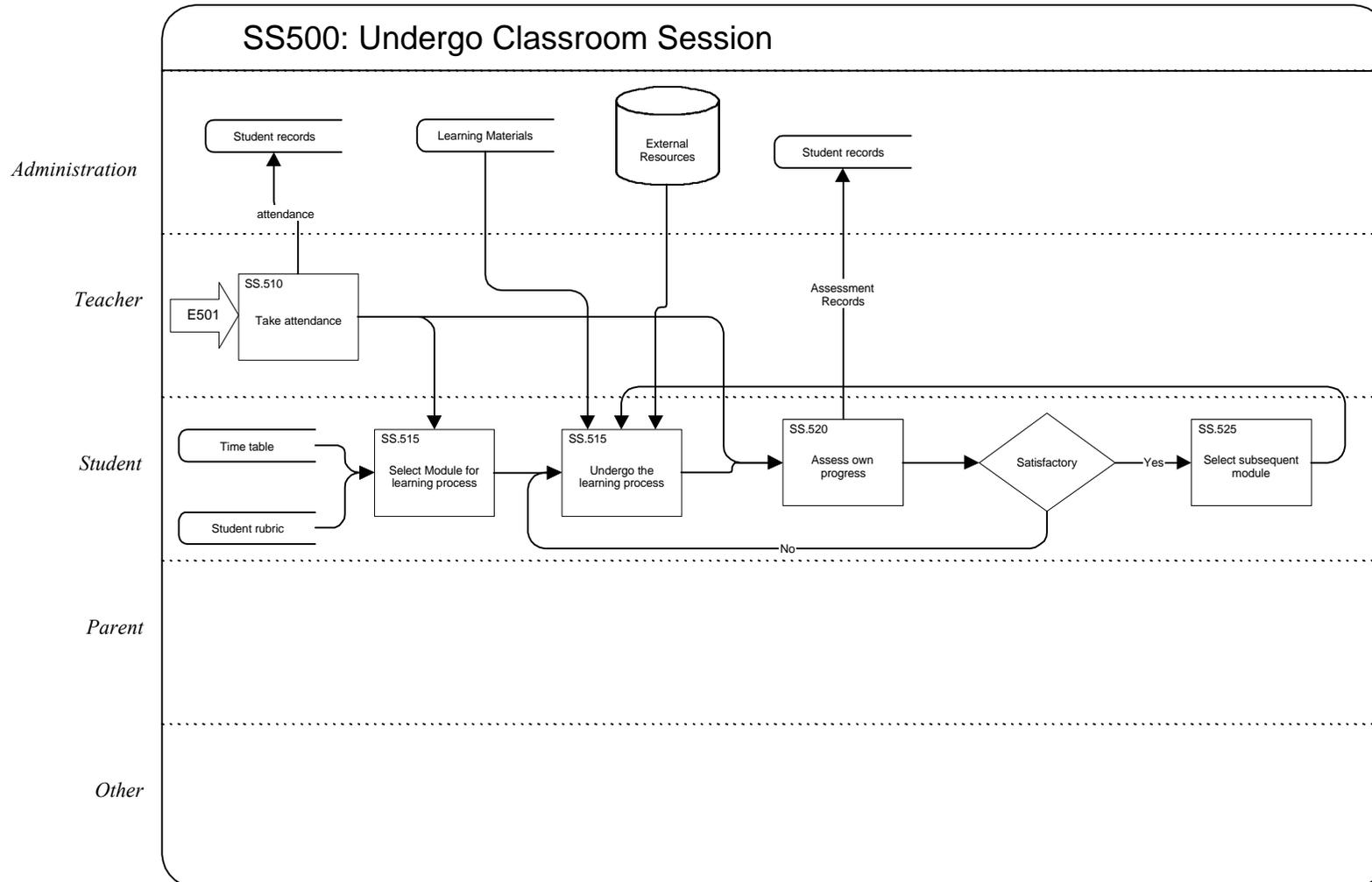
E302: Beginning of School Year

Process Flow Diagram of Smart School (continued)



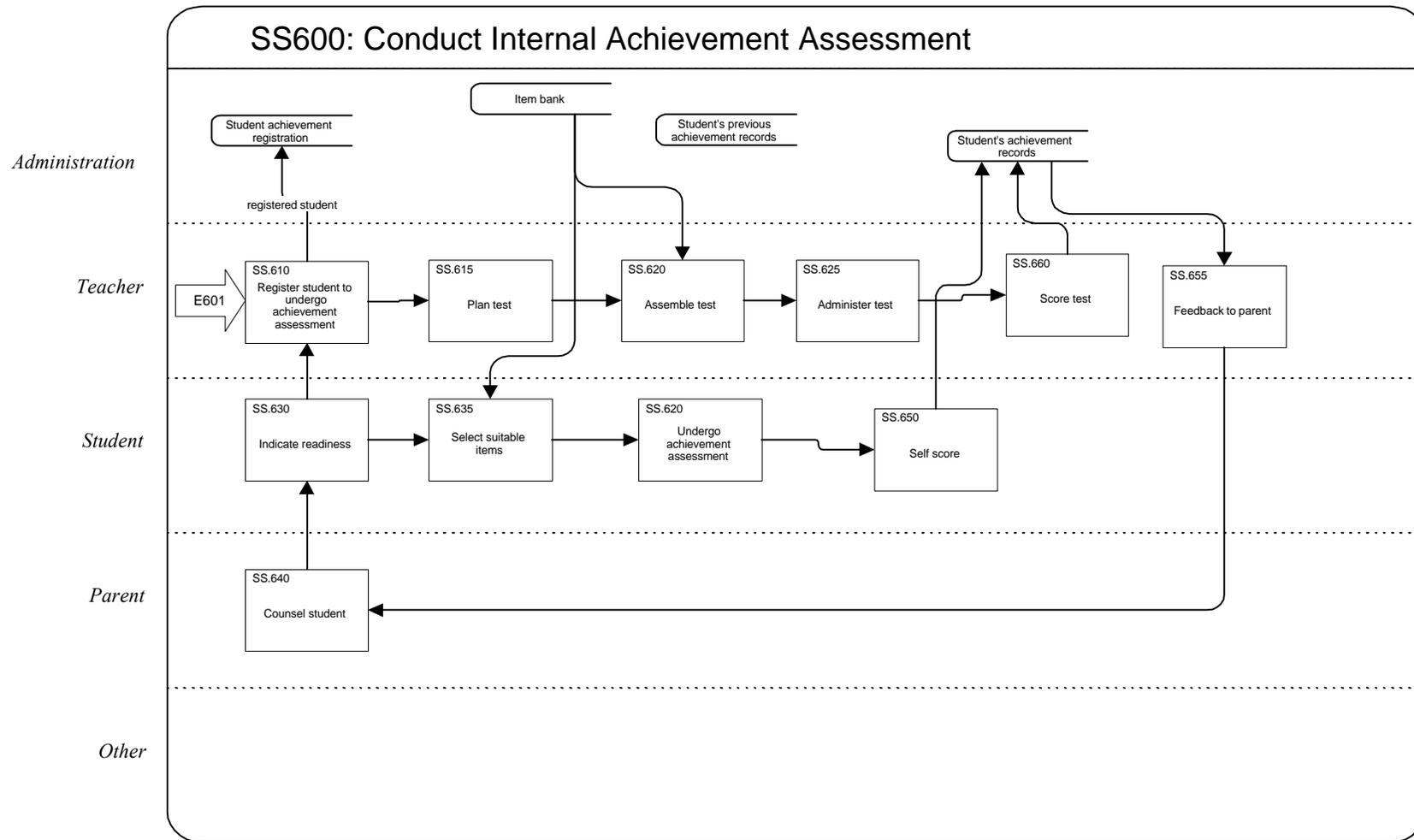
- Supported Events**
- E401: Beginning of School Year
  - E402: Volunteer to provide resources
  - E403: Volunteer to provide aid
  - E404: Volunteer to other activities
  - E405: Phone, fax, e-mail students, parents to arrange schedule

Process Flow Diagram of Smart School (continued)



**Supported Events**  
 E501: Students arrive in classroom

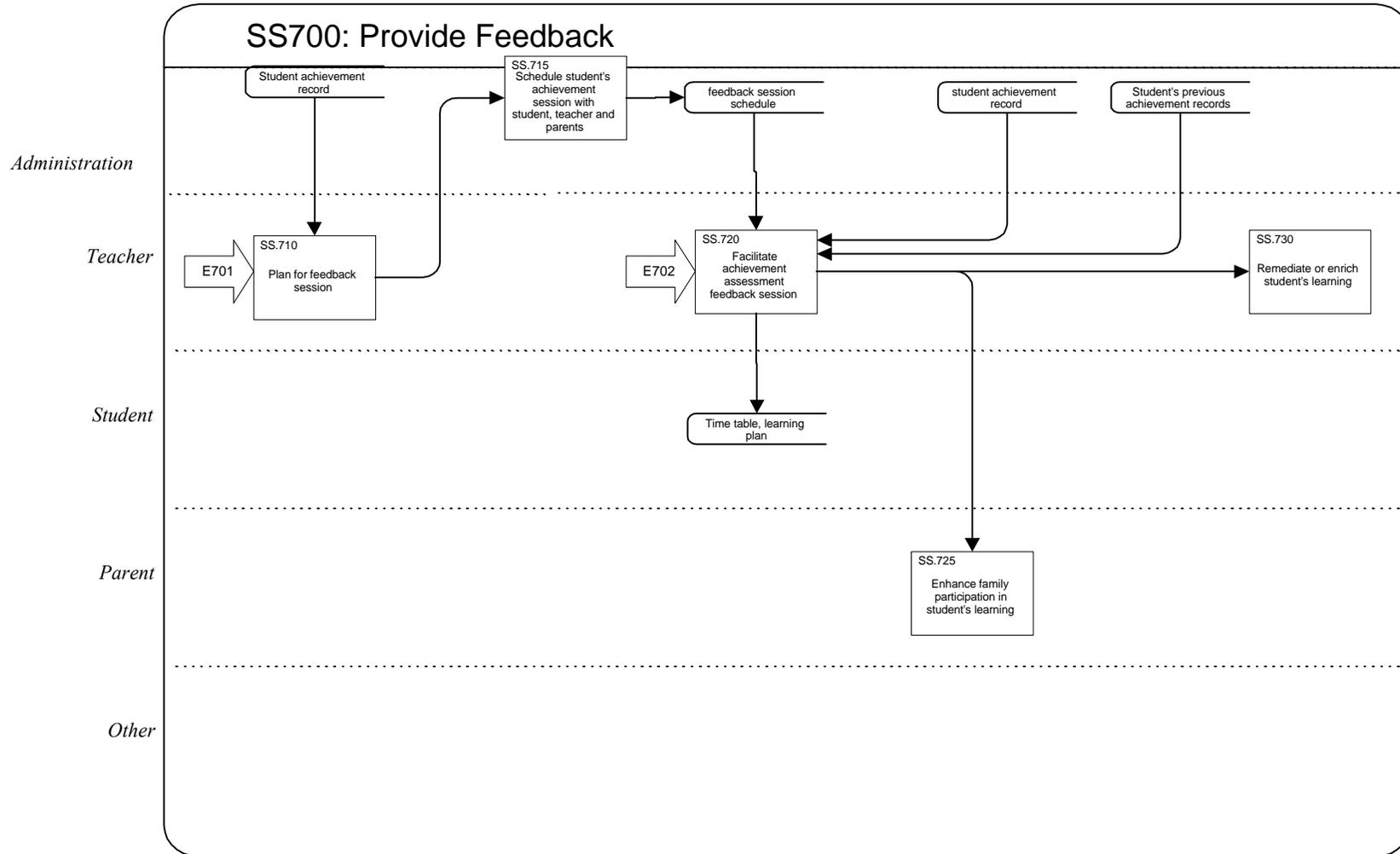
Process Flow Diagram of Smart School (continued)



**Supported Events**

- E601: Students register for achievement assessment
- E602: Students arrive for achievement assessment session

Process Flow Diagram of Smart School (continued)

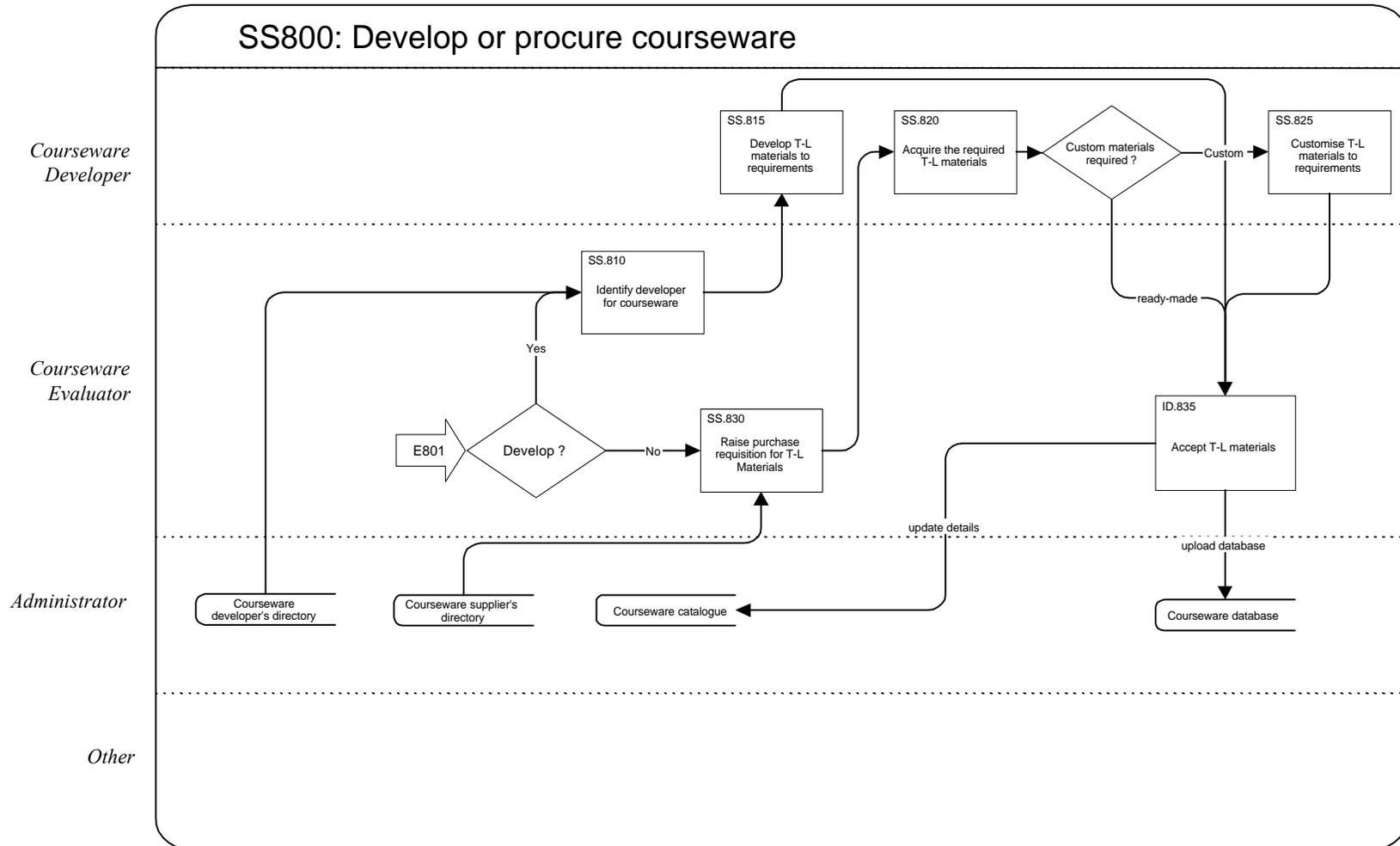


**Supported Events**

E701: Achievement assessment results arrive

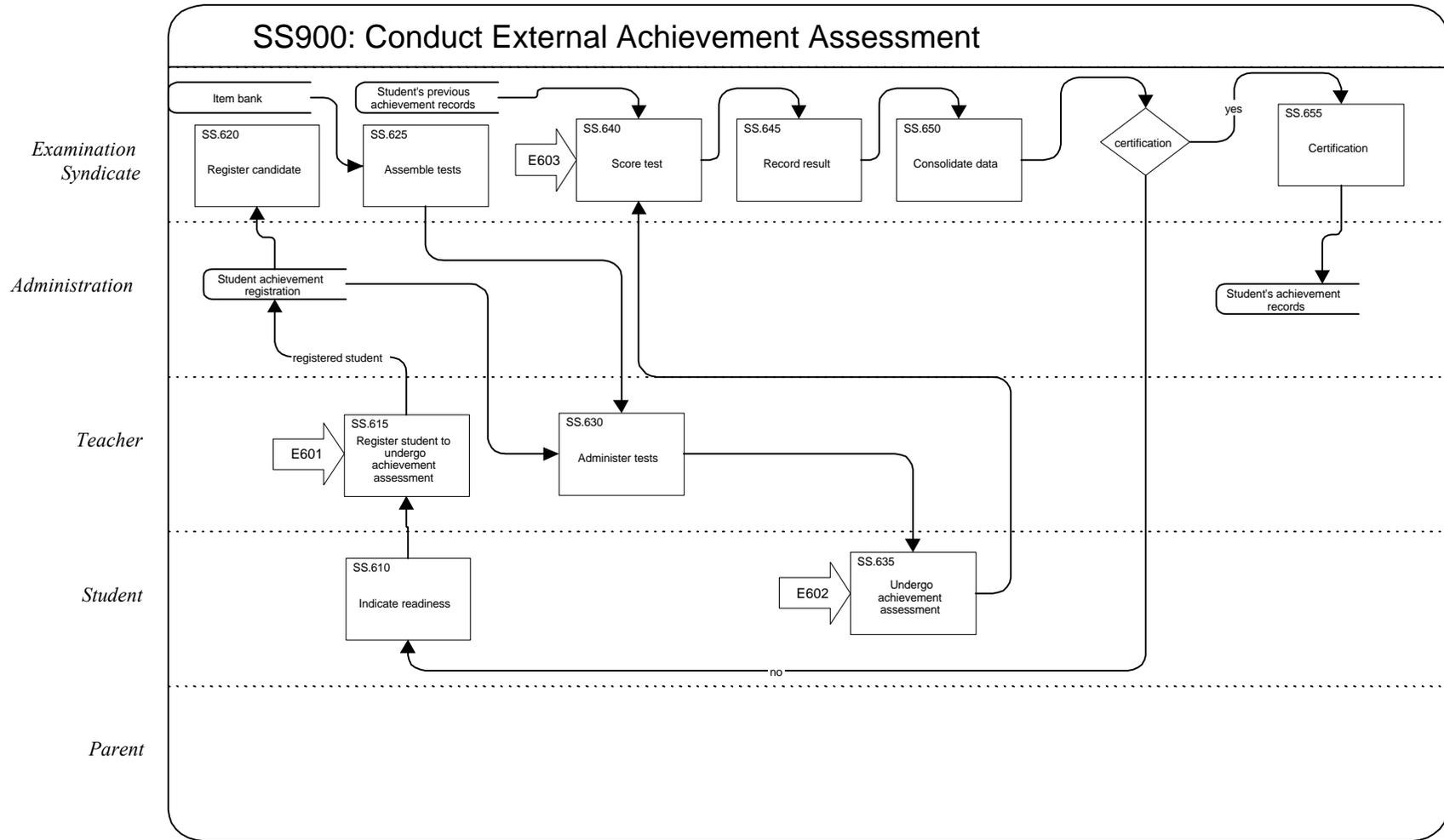
E702: Achievement assessment feedback session's concerned parties arrive (parents, teachers, students)

Process Flow Diagram of Smart School (continued)



**Supported Events**  
 E801: Software required

Process Flow Diagram of Smart School (continued)



Supported Events

- E901: Students register for achievement assessment
- E902: Students arrive for achievement assessment session
- E903: Score students' achievement assessment

# The Malaysian Smart School

## Appendix 4 Professional Development for Smart School Teachers

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## Professional development for Smart School teachers

### 1. MISSION

To nurture the qualities and develop the professional practice needed to facilitate learning in a technology enriched environment.

### 2. THE PROFESSIONAL PRACTICE

This framework of teacher education for Smart Schools identifies those aspects of a teachers responsibilities that promote learning. These responsibilities define what teachers should know and be able to do in carrying out their professional practice. They are divided into four domains namely (1) Planning and preparation of curriculum; (2) Managing a technology enriched classroom; (3) Delivering effective instruction; and (4) Handling professional task as an educator.

Domain 1 (Planning and Preparation of the Curriculum Content) outlines how teachers organise content and how it is translated into activities and exercises in the classroom. Skills and knowledge needed include:

1a: Designing instructional materials and resources

1b: Assessing student learning

Domain 2 (Managing A Technology Enriched Classroom) delineates the kind of classroom interactions that establish a comfortable and respectful classroom environment needed to promote a culture for learning. Skills and knowledge needed include:

2a: Managing classroom procedures

2b: Creating an environment of respect and support

Domain 3 (Delivering Effective Instruction) outlines the ways in which teachers should organise and present the content, and the roles to assume in encouraging their students to take charge of their own learning. Skills and knowledge needed include:

3a: Facilitating students in cognitively stimulating activities

3b: Utilising technology for effective instruction

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**Professional development for Smart School teachers (continued)**

Domain 4 (Handling Professional Tasks as an Educator) spells out a wide range of roles associated with being an educator. These responsibilities range from self-reflection, the maintenance of records and other paperwork as well as interaction with the families of students and the larger community. Skills and knowledge needed include:

4a: Communicating with colleagues and parents

4b: Selecting use of effective technology-based resources

Three main concepts of Smart Schools need to be applied to the domains of professional responsibilities of teachers. Significant changes in professional practice will only occur when these concepts are effectively translated into the professional development of teachers. These concepts are (1) appropriate use of technology, (2) thinking and creativity enhancement and (3) values inculcation.

**Appropriate use of technology**

Using technology to enhance learning is a major responsibility expected of Smart School teachers. Technology is used as a tool and should be integrated into the curriculum rather than be taught separately as an end in itself. It is best learned within the context of meaningful tasks.

**Thinking and creativity enhancement**

Teaching in Smart Schools is to enhance thinking and creativity. Towards achieving this, teaching has to allow students to determine for themselves when and how they learn. Training needed for teachers to support their effort to improve this includes:

- using methodologies such as student-centred instruction, team teaching, interdisciplinary project-based instruction and individually-paced instruction

- taking advantage of other delivery vehicles such as interactive multimedia and the internet

- using technology to enhance co-operative learning skills

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**Professional development for Smart School teachers (continued)****Values Inculcation**

Teaching in Smart Schools needs to help students develop sound moral reasoning skills to reach the higher stages of moral development. Teachers need to integrate activities that focus on moral development which include forming values, organising a value system and developing consistent philosophy of life.

**3. TEACHER EDUCATION FOR SMART SCHOOLS**

Teacher education is seen as a continuum of life-long professional development based on the concept of continuous learning and partnership. The training framework covers three target groups namely, the pre-service training for trainee teachers and the in-service training for teachers and trainers.

**3.1 Pre-service Training**

The teacher training colleges provide initial training for both primary and secondary teachers while the universities train only secondary school teachers. Smart teaching and learning elements such as higher order thinking skills and moral values have to be incorporated into all pre-service training curriculum.

The teaching methodology of all subject areas need to be given a fresh orientation towards a more experiential and student-centred approach supported by interactive multimedia software and network learning. The overall objective is to produce beginning teachers to be computer literate and comfortable in the use of technology in the design and delivery of lessons.

**3.2 In-service Training**

The in-service programme for teachers is structured along a developmental sequence with projected long term training objectives specifically on technology supported learning. The **first phase** inducts participants into core professional skills such as basic information technology skills, facilitating skills, critical and creative skills, and assessment skills. To instil awareness of instructional changes, teachers are exposed to the concept and goals of Smart Schools.

The **second phase** focuses on the integration of these skills into subject areas through collaborative strategies supported by technology. Training shifts from the basic use of technology for increased productivity and allows teachers to explore their creative and innovative potentials in the preparation of teaching and learning materials. A major emphasis is on the use of computers to access continuously updated information through networking and to accomplish management goals.

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### Professional development for Smart School teachers (continued)

The trainers will follow the same programme as for teachers. This allows trainers to be engaged in the same kind of learning activities that they are to provide to the teachers. A major emphasis is to create an environment of learning through a culture of partnership and collaboration between teachers and their trainers.

#### 3.3 Features of Training Programmes

To operationalise the professional practices of Smart School teachers, some pertinent features must be applied in planning training programmes. These features are as follows:

##### **The programme is practical oriented.**

The views, beliefs and actions of teachers during practicum are significant in initiating changes in the classroom. Practicum are designed to provide ample opportunities for teachers to model new ideas and techniques in engaging students in active learning. Teachers are given hands-on experience guided by accomplished trainers to learn successful teaching strategies. Teachers need to be engaged in team teaching and collegial patterns of work which focus on new learning tasks and new situations.

##### **Follow-Up Support**

Follow-up support is a critical factor in ensuring teachers implement what they learned or prepared during training. Trainers should contact teachers in their classroom to offer on-site coaching and technical support with technology. Trainers should help teachers to develop support team and encourage peer coaching thus providing opportunities to share and reflect practice within their own topic, level and subjects.

# The Malaysian Smart School

## Appendix 5 The Smart School Project Team

## Members of the Smart School Task Force

The Smart School Task Force is composed of officers from the Ministry of Education and members of industry. The names listed below, in alphabetical order, represent those that were in the core of the Task Force, but there were many others, too numerous to mention here, who contributed in some way or another to the project.

Abdul Wahab Dahalan	Michael Foong
Abu Bakar Ab. Rahim	Mohd Sidek Abd Hamid
Chan Foong Mae	Dr. Noor Azmi Ibrahim
Charmaine Saw	Noor Bakar
Cyril Christopher Singham	Osamu Konoike
David Ehrlich	Rashid Ghani
Dzofrain Azmi	Dr. Rohani Abdul Hamid
Fami Mohd. Kunju	Roslan Rashidi
Fazidah Fariyah Md. Ali	Rosma Osman
Gaurav Jain	Rosana Ahmad Nordin
Hitoshi Kato	Salwana Ali
Jaffri Ibrahim	Dr. Siti Hawa Ahmad
Juhari Md. Zain	Tan Ying Kee
Dr. Khodori Ahmad	Dr. Vanaja Nethi
Kamarulzaman Ahmad	Vimala Pillai
Dr. Lee Oi Kum	Dato' Dr. Vincent Lowe
Dr. Lee Ong Kim	William H. Smith
Masamachi Shutoh	Yuzari Ahmad

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# The Malaysian Smart School Glossary of Terms

GlossaryWord	Description
Affective Assessment	The evaluation of the affective domain of an individual within a stipulated period of time based on the goals of the National Philosophy of Education.
Assessment	An on-going process of measuring the performance of something through the use of a variety of measuring instruments.
Authentic Assessment	A process of assessment that takes into consideration learners different pace of learning and uses a variety of measurement instruments to measure the process and product of learning.
Computer Adaptive Tests	A test which is computer-generated and administered that can adapt itself to the needs and ability level of the student.
Construct	A thing or a human dimension for example knowledge.
Criteria	A statement that indicates the level of attainment to be achieved by an individual in a particular stage of learning.
Criterion-Referenced Assessment	A form of assessment that evaluates an individual s performance based on a predetermined set criteria.
De	Data obtained from centralised assessment.
Di	Data obtained from school-based assessment that is conducted using standardised and calibrated items from centrally controlled item banks.
Dial-up	An Internet account that can connect any stand-alone PC directly to the Internet. The PC that accesses a dial-in connection needs either a modem to connect via a regular phone line or a terminal adapter (TA) to connect via an ISDN phone line.
Domain	Area or classification of a thing or construct.
Domain Name	The unique name that identifies an Internet site.

GlossaryWord	Description
Educational Standards	Statements pertaining to the minimum level of attainment to be achieved by an individual based on a predetermined set criteria and operationalized by a set of performance indicators in line with the aspirations of the National Philosophy of Education.
Element-Based Assessment	An assessment approach that focuses directly on the elements (things) that needs to be developed in an individual through the educational process.
Element-Core and Specific	<p>Something that needs to be developed in an individual through the educational process, for example a skill, competency, value or knowledge.</p> <p>Core elements refer to elements that are independent of any particular area of study or subject and appear across the curriculum.</p> <p>Specific elements refer to elements that are specifically found in a particular area of study and would not normally appear in other areas of study or subjects.</p>
Evidence	Proof of the type and characteristic of the type of performance assessed.
Fire Wall	A combination of hardware and software that separates a LAN into two or more parts for security purposes.
Holistic Data	Assessment data which has to be consolidated and used in making judgements about an individual s performance, obtained from school-based (Di) and centralised assessment (De).
Hub	A network's or system's signal distribution point where multiple circuits convene and are connected.
Humanistic Assessment	A system of assessment that provides learners with the opportunity to be assessed when they are ready.
Hurdle System	A method of combining two or more sets of data to determine the achievement of an individual as excellent, credit or satisfactory in any given test.

GlossaryWord	Description
Individual Assessment	Assessment that is administered on an individual basis to an individual when he or she is ready to be assessed.
ISDN	(Integrated Services Digital Network) A set of communications standards that enable a single phone line or optical cable to carry voice, digital network services and video.
Item/Test Bank	A bank that contains calibrated items. The items or test is classified according to a specific system and kept in a bank.
Learner-Friendly Certification System	A system of certification that takes into consideration the holistic development of an (LFCS) individual based on the National Philosophy of Education.
Leased line	A leased phone line that provides a full-time, dedicated, direct connection to the Internet.
Life-Time Data Base	A system for recording, providing descriptions and detailed reports pertaining to an individual s performance in education throughout his or her lifetime.
Multipoint Control Unit	(MCU) A device that bridges together multiple inputs so that more than three parties can participate in a video conference.
National Criteria	A statement of the Educational Standard based on the National Philosophy of Education, which determines the individual s level of achievement in the learning process.

GlossaryWord	Description
National Performance Indicator	The National Performance Indicator is a statement pertaining to the type and characteristic of the evidence that is observed when making judgement of the attainment of a criteria
On-Line Multiple Delivery	A method of administering tests which allows individuals to sit for a centralised test at any time he or she feels ready to be assessed.
Patching System	A system that allows individuals to improve their achievement in a particular area as a means of fulfilling the certification conditions or upgrading their achievement from credit to excellent.
Point of Access	A site that has an array of telecommunications equipment: modems, digital, leased lines and Internet routers.
Proxy Server	A World-Wide Web proxy server acts on behalf of a number of Web browsing clients. Instead of a client having to fetch documents itself, it makes a request to the proxy. The proxy fetches the document and returns it to the client.
Router	A network device that enables the network to reroute messages it receives that are intended for other networks. The network with the router receives the message and sends it on its way exactly as received.
Self Assessment	A form of assessment that allows the individual to identify the standard or criteria to be achieved or internalized so that judgement can be made by the individual as to the level that he or she has achieved when evaluating his work or performance in the learning process.
Server	A computer, or a software package, that provides a specific kind of service to client software running on other computers.
Single ID	A unique identification number or unit that is assigned to each individual to be used in the Life-time Data Base (LTDB).