

How to implement a Managed Learning Environment

Key lessons from primary and secondary education



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Education: a landscape in transformation

The education sector is at a crossroads. It must evolve and adapt if it is to prepare students for the challenges of the new “Knowledge Society” – challenges that include the global economy, the fast pace of economic change and the unpredictability of where we will be in one or two years’ time, let alone ten or twenty. The role of education therefore will be to encourage flexibility, to prepare students to handle vast amounts of information from a multitude of sources, and to work in teams that may be virtual, global and multicultural. They will have to be adaptable and innovative and they will have to be competent in the use of information and communication technology (ICT) as a tool and a resource.

As the educational landscape continues to evolve, a number of key trends are emerging:

- **The need for continuous improvement in standards** For educators the prime objective is always to provide every student with a high quality education. This is also universally accepted as being the major contributory factor in achieving economic growth and prosperity within a nation.
- **Improvements in the skills base of the population** Beginning with literacy, numeracy and basic skills, including the use of information and communications technology
- **The need for retention of students** Encouraging them to remain in education longer, being prepared for the changing work environment and the growing emphasis on life-long learning
- **The importance of social inclusion** Government policy in most countries is placing enormous emphasis on giving every child equal access to a high-quality education irrespective of ability or disability, background, geographical location, gender, ethnicity or mother tongue.
- **Performance measurement** With the spotlight now firmly focused on education as a means to deliver personal well-being and the economic goals of the nation, measurement of success in improving standards has become a high-profile issue.
- **Management of the Student Information Lifecycle** The ability to keep records of a student’s progress throughout their educational career – from kindergarten to university and on throughout their lifelong learning – is becoming more and more important. This, however, is an issue that is still under debate, due to the ethical and privacy questions it raises.
- **Financial and management accountability** Schools are now required to do much more than teach. As their autonomy increases, they are becoming increasingly motivated by the need to manage budgets effectively and reduce costs where possible.
- **ICT strategy** The growing need for a defined ICT strategy around education and learning, including the ICT procurement and maintenance processes, as well as the resource planning required to support the existing and evolving infrastructure

Governments have high expectations of ICT. It is the cornerstone of the education sector’s objective of preparing students for the Knowledge Society of the future. ICT is therefore seen as an enabler, and a variety of specific initiatives have already been implemented at national, regional or local level which combine ICT aspects with e-learning, educational objectives and administrative tasks, thus giving rise to the Managed Learning Environment.

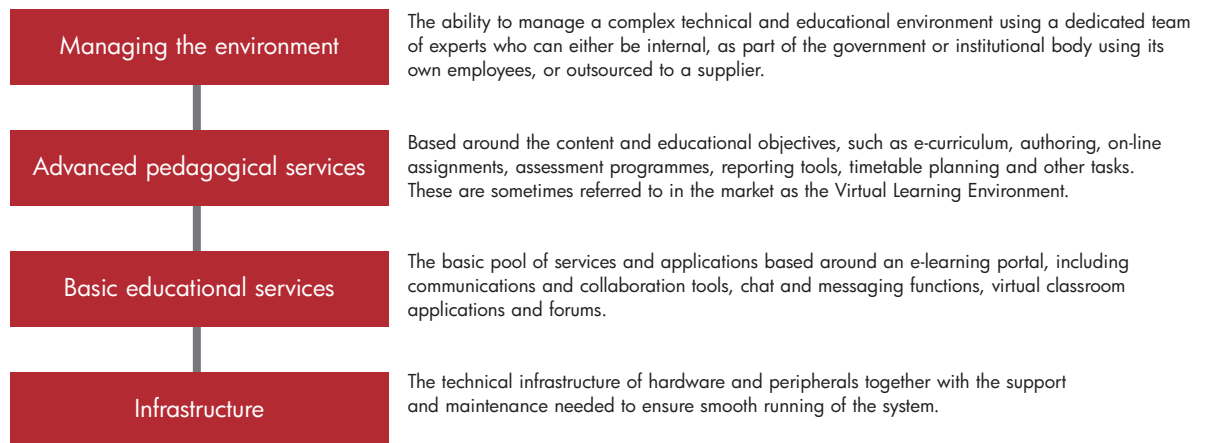


The Managed Learning Environment: a technological means to an educational end?

The Managed Learning Environment (MLE) is a new approach to providing enhanced educational services to schools using ICT as the underlying infrastructure. In a nutshell, an MLE includes networked computers, together with educational content and services, all provided as an integrated and supported framework, installed, maintained and upgraded by specialist providers. The advantage to schools is that teachers and students are free to concentrate on teaching and learning, while the providers ensure that the ICT service continues to work to meet their needs. The technology is thus transparent, a means to an end.

Within Europe, Middle East and Africa (EMEA) countries, the MLE is the major trend in the provision of education services. Governments are establishing a new vision and preparing the guidelines for the future of education and these will require an MLE if they are to be realised. Large-scale projects already exist in the UK, and in the Nordic countries, with pilot schemes appearing in France, Germany and Spain. Whilst long-term EU member nations are using MLEs to transform their well-established education systems, new accession countries are also looking at ways to revolutionise theirs, using the MLE approach to catapult them into the 21st century educational landscape.

The MLE is a service-driven educational framework based on four distinct layers:



The Managed Learning Environment is rapidly becoming an indispensable resource for the education sector, able to deliver the following advantages:

- **Learning tools** A vast array of tools for learning is available and, because they can be accessed by anyone with secure access, this allows the sharing of best practice across departments and regions. The MLE therefore releases teachers to teach rather than to spend their time in paperwork and administrative tasks.
- **Enhanced access** An MLE provides the opportunity for young people in smaller schools in rural communities to have equal access to the same range of subjects and educational resources as those in bigger schools irrespective of student abilities, geography or school. Those absent from school for health, disciplinary or other reasons can also continue their studies through remote access.
- **Information exchange** Common educational standards can be achieved through the exchange of information across educational communities. In addition, the MLE facilitates personalised learning and a wide variety of learning styles, such as distance learning, collaborative learning, offline learning through structured lessons and resources, including programmes for those with special educational needs, including gifted children.
- **Sharing best practice** An MLE provides an effective means for developing and sharing best practice on a wider level than before – regionally and nationally, not just within schools. Teachers are also able to use the MLE for online administration, sharing of curriculum and access to a wide range of resources and materials, thus allowing more time to focus on classroom teaching.
- **Communication and collaboration** An MLE encourages enhanced communication and collaboration for a number of user communities, including students, teachers, parents, schools, education authorities or government departments.

The MLE: a win-win for all players

From governments achieving their objectives, to the individual pupil who receives a better education, there are no losers in the Managed Learning Environment. Benefits permeate through the entire educational landscape.

Central and regional governments

At government level, the introduction of an MLE is an ideal opportunity to consolidate the overall ICT and educational strategy of the country centrally, regionally and locally. The key benefits are consistency in ICT provision across the educational sector, leading to equal access, which improves standards, provides greater accountability, optimised processes and better reporting.

Governments see the MLE solution as a way of delivering their high-level objectives of providing equal access to high-quality education, delivering the national curriculum for all students and improving educational standards. This is particularly important in rural locations or in inner city schools, where teacher recruitment issues have previously affected the quality of teaching. An MLE can also make provision for a wide range of disabilities, thus improving access to learning for all students.

The introduction of an MLE requires a comprehensive review of the ICT infrastructure at all levels of education and therefore helps to establish a consistent approach to ICT. Historically, the development of ICT in schools has been haphazard and unstructured. A review of procurement processes, and whether these should be handled locally, regionally or centrally, is a necessary prerequisite for further ICT investment. In addition, a definition of the minimum requirements for an MLE is needed, including the telecoms infrastructure, broadband connectivity, the need for ICT refresh and renewal and a maintenance and support strategy.

In addition, the wide variety of assessment and reporting tools that can be introduced as part of an MLE provide a wealth of data that can be used to analyse and predict trends and successes in education, the community and the economy. This also provides government with their desired outcomes of measurement of performance and accountability.

Finally, MLEs allow the expansion of learning communities beyond the individual school throughout the country and even beyond national boundaries, thus widening horizons and promoting global cooperation.

Students and teachers

Within educational institutions, students are quick to recognise the benefits of a more ICT-oriented environment. Wider resources in research and teaching materials become instantly available through e-learning portals, and they are able to monitor more closely their individual learning patterns and progress and tailor their learning programmes to their own ability and learning style. A wide range of possibilities becomes available, including:

- Access to a multi-media based curriculum to enrich the learning experience
- Greater access to information using the Internet and online libraries
- Opportunities to work collaboratively with other students in other schools and locations

For teaching staff, the MLE provides a wealth of resource, both in the use of ICT in active and participative learning, but also in extending the range of materials available for teaching and in being able to share best practice across the school and across other educational establishments.

- Easier management of school premises and materials
- Sharing of best practice across other educational establishments
- Easy creation of educational content with authoring tools
- Introduction of online and offline assignments
- Direct communication with parents

The use of administrative systems within the MLE and the sharing of information across these systems also frees the teacher from many “paperwork” functions, allowing them to concentrate on their prime objective of teaching. Tracking students’ work, marking, monitoring progress and reporting can all be made easier through the MLE.



Parents

Through the use of ICT and the MLE infrastructure, parents are better able to follow their children's progress, with access to online information, monitoring, marking and reports, the ability to ask questions of the teachers, monitor homework and generally become more involved in the educational process. It gives greater transparency in the reporting of progress and allows parents to be alerted quickly if there is a problem. However, this level of involvement varies greatly from country to country across Europe. In the UK and Scandinavia the involvement of parents is encouraged and facilitated, whereas the more traditional societies of Southern Europe sometimes appear more reticent about involving parents too closely.

Administrative bodies

School administrations have traditionally used a variety of systems to record attendance, performance, national results and statistics, plus their often stand-alone accounting and financial packages. Introducing an MLE project allows the integration of administrative back-office applications, which will significantly reduce operating costs and improve overall efficiency, allowing time for more important proactive tasks, such as managing absence rates, monitoring discipline issues, and more.

As schools face pressures on their budgets, an MLE will enable them to manage budgets more effectively, share resources where appropriate and therefore free up valuable administrative resources, whilst providing more detailed reporting structures and a framework for communication between all education stakeholders.

Improved and consolidated reporting helps in the decision-making process and in the analysis of results and other statistical information. As schools respond to the need for greater accountability, they must provide more detailed information about the performance of the school, its staff and its students. This has increased the need for suitable back-office systems and business processes to achieve this efficiently and effectively.

HP Managed Learning Solutions: how to build an MLE

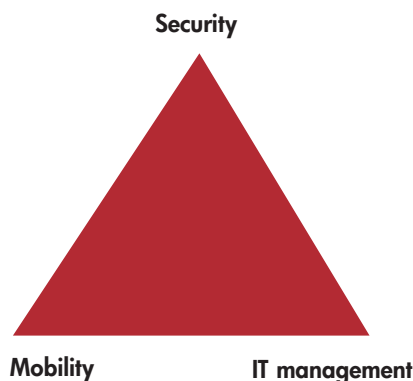
HP has developed a targeted set of end-to-end solutions – the HP Managed Learning Solutions – that fulfil the various country-specific requirements for Managed Learning Environments. These HP solutions reflect the four layers of the MLE structure previously defined: the infrastructure, basic educational services, advanced pedagogical and content-related services, and managed services. In addition, HP has a range of specific back-office solutions to address the administrative needs of the institution.

HP Managed Learning Solutions have been designed with one major objective in mind – to merge the technology and the educational elements closely to provide customers with the ability to cope with change flexibly and efficiently. In order to do so, HP has used its Adaptive Enterprise strategy framework to develop an open architecture, based on international standards, to simplify the overall ICT organisation.

The components that make up HP Managed Learning Solutions present educational institutions with a comprehensive portfolio of end-to-end solutions, whose end goal is to improve education by making the institutions more agile. Agility is the cornerstone of an innovative organisation, helping institutions respond quickly to change, meet educational needs and foster new ideas.

HP infrastructure solutions

HP offers a broad range of infrastructure solutions ideal for deployment in an MLE strategy, from back- and front-office systems to access devices, security – such as access authentication – mobility, IT consolidation, HP OpenView management solutions and Total Print Management solutions for printing and imaging.



Security Built into HP products and solutions – trusted solutions such as HP OpenView Select Access provide centralised enforcement of user privileges while adding authentication and authorisation.

Mobility HP can design secure mobility architectures and provide solutions for managing mobile messaging, mobile collaboration and mobile devices, extending the reach of the IT infrastructure anywhere and at any time.

IT management Using the scalable and flexible tools in the HP OpenView management solutions portfolio to manage network products, hardware and applications, and the large number of peripheral devices included in the system, HP can help balance the deployment of the data centre. This allows the proactive management of the overall performance, or load balancing, of the system, leading to improved cost efficiency and productivity.

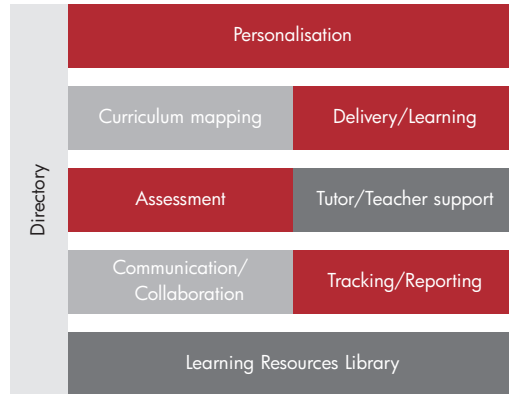
HP basic educational services

- **Messaging and hosted messaging** HP institution portal solutions provide access to a wide variety of information sources and applications through a single browser window. These solutions facilitate the roll-out of new applications and easier exchange of information. HP provides secure solutions for e-mail, personal calendars group scheduling, rules-based message management, instant messaging and electronic discussions. HP is also the leading hardware platform for Microsoft® Exchange and messaging and collaborative applications, with a full portfolio of supporting services.
- **Knowledge and collaboration portals** HP offers integrated collaborative solutions enabling teachers to prepare, collaborate and share information with students, parents and teachers, extending learning communities beyond the horizons of the school regionally, nationally and internationally.
- **E-learning via Virtual Classroom** HP offers Virtual Classroom technology to deliver educational services to distant students with all necessary features and functions to replicate the classroom environment. This technology can help reduce classroom costs and extend the reach of the conventional classroom, allowing remote access learning and continued education for students who are unable to attend school for health, geographical or disciplinary reasons.

HP advanced pedagogical services

These are the applications and services used by education end users, such as students and teachers, to enable the creation of e-curriculum content and assignments, on and offline, and the assessment, tracking and reporting of progress and generation of statistics. They include digital libraries, knowledge networks and content and assessment management systems, used by students and staff to post and access curriculum, share digital media, and collaborate through messaging and file-sharing using basic education portal services. Together, these make up the Virtual Learning Environment (VLE), a computer-based environment that provides technology-supported learning through the delivery of web-based programmes.

- **Virtual Learning Environment** The following diagram shows the core building blocks of a VLE based on HP's experience of designing these environments.



- **Digital libraries and content management** HP provides innovative technology for digital libraries including new tools that incorporate rich media capabilities to provide easy access to information and services to digitalise available library resources. Digital libraries are closely integrated with the VLE solution set.

HP managed solutions

HP can fully manage or host the ICT infrastructure for the educational institution, or simply host the messaging or collaboration element. HP Services offers a comprehensive Managed Services portfolio that features a range of solutions, including strategic outsourcing and innovative utility pricing solutions. HP Services simplifies the management of IT and facilitates the ongoing alignment of IT with the overall strategy. Using proven methodologies, this flexible approach ensures that schools receive predictable levels of support – when and where they need it.

Administrative management solutions

- **Student data and campus solutions** In conjunction with partners such as Oracle®/PeopleSoft®, SAP and e-Charlemagne, HP offers solutions to support student records, recruitment and admissions needs, and database management of student registration and attendance. These offerings can be interlinked with course management products, and student exchange and foreign student information systems.
- **Administrative and enterprise resource planning (ERP) systems** Together with a number of world-class partners, such as SAP and Oracle/PeopleSoft, HP offers centralised and automated business processes for total school management, encompassing areas such as finance, procurement, human resources, payroll, data analysis and government regulatory data management (e.g. results statistics packages, etc.).

HP services

HP education professionals work actively to help organisations capitalise on change and transform education through enhanced access to knowledge. The HP strength lies in providing end-to-end solutions – engaging with customers to define their requirements and design, build, integrate and operate a managed learning solution that will:

- Provide continuous support for the change management process by accompanying the customer throughout the implementation and long-term roll-out of the project
- Include teacher training to maximise the potential of the project
- Develop new education services and solutions for teachers, students, parents and administrators, improving knowledge sharing, encouraging innovation and reducing administrative tasks
- Consolidate the existing, heterogeneous infrastructure, reducing operating costs, improving performance and maximising return
- Enable the organisation to become more flexible and adaptive in order to comply with rapidly changing legislation, rules and demands



Implementing an MLE: learning the lessons

HP is uniquely positioned to help its customers with their MLE projects, having recently implemented two of the largest MLE projects in the world: Northern Ireland's Classroom 2000 Project and M@rte in Sardinia (see case studies on pages 8, 9 and 10). These complex, large-scale projects can handle over to 350,000 students aged between 2 and 18 years, and they include a wide variety of devices, operating systems and applications, from open source to proprietary platforms.

Case study 1 – providing access for all How HP helped Sardinian schools to bridge the digital divide

The Sardinian Regional Education Administration needed to find a way to address the problem of rural depopulation and provide an inclusive education for all levels of ability, for those in remote areas and for those with disabilities. The solution, developed in conjunction with HP, was to introduce a Managed Learning Environment across the island, promoting a new model of co-operation between schools and resulting in a true community of education.

Sardinia is one of the largest islands in the Mediterranean. Much of its 1.6 million population is spread across the island in small, sometimes remote rural communities. The problem of a declining rural depopulation in the inland areas of Sardinia – caused in part by the lack of access to high quality educational facilities and resources – was one of the major issues the Sardinian Regional Education Administration wished to address. In addition, the Regional Administration wanted to implement a technology infrastructure across the island that would:

- Enable teachers to share resources and best practice
- Give all students access to high-quality learning materials and programmes at school and at home, irrespective of their ability, disability or location
- Give learners new opportunities in distance learning, self-paced programmes and interactive and collaborative education
- Improve communications between students, teachers and parents
- Improve the overall standard of education on the island

In order to achieve these aims, the Italian Ministry of Education and the Regional Administration needed an implementation partner who had the experience and expertise to handle such a highly complex and ambitious project, connecting 150,000 students and 15,000 teachers in 543 primary, middle and secondary schools. It needed an organisation that could deliver a high-tech, low-cost solution.

With its proven track record in technology solutions specifically for the education sector, HP was able to relate to the customer's objectives and share the Administration's vision.

Sharing the vision

HP took responsibility for the management of the project, designing the application architecture and security framework. It selected an e-learning solution that would create a dedicated intranet and extranet and allow access to the Internet and a range of multimedia courses.

HP also managed the deployment of the hardware across over 600 classrooms, together with network applications and the integration of the whole project. This included over 8,000 PCs, 100 servers and a range of printers, scanners and other peripherals.

In order to carry out the project, HP assembled a consortium of partners with the very best expertise in all areas, including local partners with knowledge of the educational environment, required e-learning content and cultural background.

| | |
|------------------|---|
| Partners: | De Agostini Spa (leading Italian publisher) |
| | Tiscali spa (telecoms – network connectivity and hosting) |
| | Ifras srl (logistics) |
| | Consorzio Tecnofor (training specialists) |

Delivering improved teaching, equal access and enhanced learning

The completion of the project has provided electronic communication between some 550 schools, 15,000 teachers and 150,000 students. The new technology has dramatically improved access to resources for all students, providing equal learning opportunities for students who are restricted by location or ability.

Standards are set to rise through the many improvements in teaching methods, including the introduction of self-paced learning, interactive programmes and collaborative projects with peers across various schools. In addition, the administration of student records and other tasks on the system have freed time for teachers, enabling them to concentrate more of their time and effort on lesson preparation and communication with students and parents.

Thanks to HP expertise in providing e-learning solutions to educational establishments, Sardinian schools now have a stable platform for the future and a marked improvement in the quality of education they can deliver to all students, whatever their abilities and wherever they are located.

Case study 2 – stepping into the information age

How HP is turning Northern Ireland's C2K vision into reality

Northern Ireland has a vision – a project that will put the province into the forefront of the world of e-learning, enabling 350,000 pupils and 20,000 teachers across over 1,200 schools to take a major step into the information age.

This major programme of educational reform, launched by the Government of Northern Ireland as the Classroom 2000 – or C2K – Project, will result in every pupil having his or her own secure e-mail address from the first day they enter primary school, and every teacher, student and administrator being connected from school to the Internet. Online educational resources and tools are provided from a dedicated data centre in Belfast.

The world of opportunities this Managed Learning Environment (MLE) opens for those involved in the education process is enormous and involves the sharing of resources and best practice, and equal access for all to online educational tools and materials such as virtual classrooms and collaborative projects.

In implementing the \$100M, five-year project, the Government of Northern Ireland wanted to achieve a variety of learning and teaching programmes and outcomes:

- Teachers should be able to share best practice and monitor pupils' progress more effectively.
- Pupils should be able to work on joint projects across schools.
- Children should have easier access to resources inside and outside school.
- Teachers should have more time for classroom teaching.
- Every child should have a personalised learning experience.
- The overall quality of education in the province should be improved.

The project was groundbreaking. It is one of the largest e-learning projects in the world and has had to make use of emerging technologies. It required an efficient infrastructure on a vast scale and C2K needed a partner that could provide this leading-edge technology handle the scope and scale of the MLE, and also understand and share the vision.



HP Services had the global presence, technology know-how and the background in providing educational solutions to be able to deliver the managed infrastructure and technology. In addition, HP's strategic partnerships with some of the most experienced practitioners in their fields are delivering the educational outcomes defined by C2K.

Joining the dots

HP Services provides the vital infrastructure that joins together the individual projects in each of the schools. This includes the wide area networking, which uses a variety of communications technologies (copper, fibre and wireless). HP also hosts the e-learning platform at the data centre, providing a set of collaborative tools that allow pupils and teachers to share information and take part in discussion forums.

Working with partners, HP is delivering a host of managed services including network design and bandwidth, messaging, e-mail and Internet access with filtering and the Managed Learning Environment. Partners include Hyperwave, which provides collaborative knowledge management and e-learning software, and Amaze, a specialist in the delivery of e-learning service through Internet technology. Tools include: text conferencing, video conferencing and video streaming. The implementation of Internet filtering is an important service designed to eliminate online bullying and access to undesirable sites.

Results – delivering a managed learning environment for all

The five-year project continues to evolve and is already delivering a wealth of educational improvements in the way teachers teach and learners learn. The dedicated data centre in Belfast presents a resource available to every schoolchild in Northern Ireland and a range of tools designed to improve their learning.

- Every child at school has a secure e-mail address.
- Internet access is available to all, with Internet filtering.
- The Belfast data centre is delivering access to resources for teachers, students and administrators.
- Teachers and learners can use new learning methods.
- Collaborative tools are allowing a greater sharing of knowledge and learning.

The global presence and professionalism of HP is delivering the project milestones on time and pulling together the partners to deliver a world-class technology solution for a 21st century educational environment for Northern Ireland's schools, teachers and students.

Key findings from experience

As the prime contractor for many large-scale MLE projects throughout Europe, including the C2K and M@rte projects described, HP has learned a number of important lessons from these implementations:

- **Providing customer service** Ultimately the purpose is to deliver educational services that will be taken up by the end users – the students, teachers and parents. It is therefore important to understand the way the project will develop, the key benefits for users, and the requirements underling each project. By clarifying these strategic points the project stands a better chance of achieving real progress and widespread acceptance and usage.
- **Scalability** Technology and applications must be scalable from small to extremely large projects, sometimes handling thousands of schools and possibly literally millions of users. Suppliers must demonstrate through proof points and benchmarking that they are capable of handling these projects.
- **The multiplier effect** Deploying an MLE into schools means that administration must be carried out at the level of the school and this may mean literally thousands of administration points. As schools are responsible for their own users, reporting must be possible at that level, both in terms of user management and in policy administration and control, for example in the use of filtering technology such as web access, email and chatrooms. The multiplier effect means that there may be thousands of schools and hundreds of thousands of users, and that management and reporting must be possible at that devolved level.
- **Helpdesk** The importance of the helpdesk function must not be underestimated. Due to the wide range of users and large-scale implementations, there may be a need for many hundreds of calls to be handled daily, varying from simple requests to a more technical intervention. A dedicated infrastructure is needed to handle the volume of requests efficiently and this must be reflected in the service level agreement.

- **Heterogeneity** The desktop and server environments are likely to vary between and even within schools with differing ages of equipment and a mixture of vendor platforms and management models. This requires a clear definition of what will be supported through the service.
- **Bandwidth** Building a system that has sufficient bandwidth for all the desirable applications, including such high bandwidth applications as video streaming and video conferencing, can present significant challenges, especially in rural locations with less developed telecommunications links.
- **User interface** The school student population may be aged from 2 to 18 years and the user interface must support this broad range by matching their intellectual needs and interests according to age and ability, and including any special needs they may have.
- **Security and user protection** Children must be protected from unsuitable materials and exploitation through the Internet and also from online bullying and intimidation from one another.
- **Review of the curriculum** In order to be able to introduce a central educational content which can be used in an MLE, a review of the entire existing curriculum needs to take place to define what elements can be re-used in an e-curriculum. Further considerations include whether it should be multi-media driven, what authoring tools to use, the objectives for future development and the ratio between the centrally developed content and what is generated locally.
- **Teacher training** The introduction of an MLE is an opportunity to assess the need for training of teachers in how to use ICT in their day-to-day activities, both in terms of their ability to use the software and hardware effectively and also in how to use ICT effectively in their educational activities – in the teaching and learning process.

HP: the trusted third party for MLE projects

HP provides powerful and relevant solutions that transform the way education takes place by adding value where it is most needed.

- HP has wide-ranging expertise in the implementation of MLE projects and is a preferred third-party partner for national and regional governments.
- HP provides advice, expertise and experience to help customers identify and avoid MLE-related pitfalls and ensure the success of their vision.
- HP provides complete, end-to-end solutions for MLEs. As a leading IT vendor, HP has extensive hardware expertise and systems knowledge:
 - Groundbreaking security technologies that are built in, not bolted on – such as HP OpenView Select Access, Identity Management and HP ProtectTools
 - Wide range of mobility solutions (management solutions to access devices)
 - HP is the market leader in systems-management software (with HP OpenView)
- With proven multi-vendor and open-source expertise, HP is able to integrate a variety of applications and operating systems, and has well-established partnerships with major international companies such as Microsoft, Intel®, SAP and Oracle, Hyperwave, Docent and Blackboard.
- HP offers an extensive services capability – including consulting and integration, technical support, helpdesk and maintenance, infrastructure management and teacher and user training.
- HP is able to offer the most favourable terms in the industry for financing of MLE implementations, including leasing, pay per use and public private partnerships.

HP works alongside its customers to provide end-to-end solutions in education which will turn their vision into strategy and then into implementation and successful operation. The greatest lesson learned by all involved in these projects is that dramatic outcomes can and are being achieved in terms of student becoming more independent in their learning, attaining high standards and developing broad, transferable skills for lifelong learning.

Ultimately, HP Managed Learning Solutions are helping to transform education through better access to information, knowledge and enhanced IT infrastructures for students and teachers, parents, administrators and governments throughout the world.

To learn more about HP's offering, visit www.hp.com

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