

The Fourth Strategy on Information Technology in Education

Realising IT Potential Unleashing Learning Power

A Holistic Approach

Consultation Document



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INFORMATION TECHNOLOGY IN EDUCATION IN HONG KONG

Building on the strengths and foundation of the previous Information Technology in Education (IT in Education) Strategies, the Education Bureau is now conducting a consultation on the Fourth Strategy on Information Technology in Education (ITE4), which focuses on **realising IT potential and unleashing the learning power of our students to learn and to excel**. We propose enhancing the IT infrastructure including providing WiFi access in all public sector schools and re-engineering the operation mode of IT resources. We will make dedicated efforts to enrich e-learning resources, build schools' professional leadership and capacity, and develop communities of practice among teachers. We will renew the curriculum, transform pedagogical and assessment practices, partner with parents and other stakeholders, and leverage community resources.

To better refine our Strategy, we are holding a two-month consultation to collect views from stakeholders and members of the public. Open forums will be organised to explain our thoughts and to collect suggestions. We warmly encourage your participation in these forums, the schedule of which is available on our website at <http://www.edb.gov.hk/ited/ite4>.

You are also welcome to send in your views by mail, fax or e-mail to the IT in Education Section of the Education Bureau on or before 6 July 2014.

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FOREWORD

Harnessing IT in education is the key to strengthening and facilitating learning and teaching in the 21st century. This goes hand in hand with our education reform in Hong Kong, which is student-centred and aims to foster life-long learning and whole-person development of our students. The three IT in Education Strategies launched since the 1998/99 school year have facilitated progressive advancements in various aspects of the school sector, including the IT infrastructure, learning resources, teachers' professional capacity and students' learning. All these have enabled a paradigm shift from a teacher-centred mode of teaching to a student-centred mode of learning that has raised students' digital literacy.

The 2014 Digital 21 Strategy, "Smarter Hong Kong, Smarter Living"¹, sets out a vibrant digital context in which Hong Kong will excel. Education is an important investment, as well as an indispensable commitment, as it is the most critical determinant that equips our next generations for success in future. As envisioned in the Strategy, the proliferation of mobile computing devices, such as smartphones and tablet computers, and the rich information provided on the Internet, have enabled learning to take place beyond the confines of time and space. Learning will no longer be confined to the classroom or bound by the school timetable and prescribed textbooks. It will become more interactive and, more importantly, self-directed, collaborative and personalised. At present, the education achievements of Hong Kong are recognised internationally. Our students have been performing well in international assessments and Hong Kong is becoming a popular destination for overseas studies. To reap the full benefits of the technological proliferation and advancements in Hong Kong, we will further tap into the power of IT and equip our students to be self-directed learners with talent and virtue.

It is against such a background that the ITE4 is formulated. To realise the potential of IT, we propose overhauling schools' IT infrastructure and equipping every classroom with WiFi access. We also propose further enriching the quality of

¹ The Commerce and Economic Development Bureau released the 2014 Digital 21 Strategy consultation document with the focus theme "Smarter Hong Kong, Smarter living" (<http://www.digital21.gov.hk/eng>) in September 2013 setting out the framework for Hong Kong to leverage new technologies to propel continuous economic development. Specifically, it stated that "*To allow students to reap the full range of benefits of e-learning through interactive and multi-media applications, equipping every (Government and aided) school with quality WiFi access to facilitate constant and stable access to the Internet,*" is one of the directions, among others, to empower the population to harness technologies.

e-learning resources by bridging content providers and users through the Hong Kong Education City, which will be playing a prominent role in coordinating the large-scale development, acquisition and licensing of e-learning resources. To maximise the power of learning, we will commit ourselves to the development of new pedagogy by using digital technologies and integrating them with pedagogy that works for teachers and students to achieve the learning goals of a flexible school curriculum that caters for all. We strongly believe that capacity building is central to the success of every education initiative. To this end, we will provide appropriate professional development programmes for school leaders and teachers. The programmes will empower our teaching force to develop and sustain e-learning. Parents, being major stakeholders in school education, will also be involved in the facilitation of e-learning and promotion of healthy and proper use of Internet resources.

We will also partner with various organisations, including the Curriculum Development Council, tertiary institutions, professional bodies and the business community. We will work closely together to serve the best interests of our students.

We invite stakeholders of the school community and members of the public to actively participate in this consultation and to share our vision. Your views and feedback will enable us to refine the strategy to better serve our next generation.

Eddie Ng
Secretary for Education

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INTRODUCTION

The Fourth Strategy on IT in Education in the Global Context

The last decade or so has witnessed a wave of technological advancements and an explosive growth in the use of mobile computing devices globally. These advancements have had a tremendous impact on different facets of our society. Most developed economies have implemented initiatives on employing IT in education. Take Asian countries, for example. Singapore has implemented three master plans in using information and communications technology (ICT) in education with the latest one launched in 2008. Japan and Korea launched the Renovating Education of the Future Project and the SMART Education project in 2010 and 2012 respectively.

2. To continue to respond to the changing context and to maintain the competitiveness of Hong Kong, our education should continue to promote students' whole-person development and foster their life-long learning capabilities. There is a great need to strengthen digital literacy, self-directed learning, collaboration, problem-solving and creative thinking skills of our students.

Goal of ITE4 – Realising IT Potential, Unleashing Learning Power

3. **Student learning is central to ITE4.** The goal of ITE4 is to unleash the learning power of all our students to learn to learn and to excel through realising the potential of IT in enhancing interactive learning and teaching experiences. We aim to strengthen students' self-directed learning, their creativity, collaboration, problem-solving and computational thinking skills, as well as ethical use of IT, in an enhanced IT environment, with schools' professional leadership and capacity, as well as the support from community partnerships.

4. In explaining how to arrive at the recommended actions for ITE4, this document presents the following chapters:

- I. **WHERE ARE WE?**
- II. **WHAT ARE OUR STRENGTHS AND EXPERIENCES?**
- III. **WHAT ARE THE OVERARCHING PRINCIPLES?**
- IV. **WHAT ARE THE RECOMMENDED ACTIONS?**
- V. **WHO WOULD BENEFIT?**

I. WHERE ARE WE?

Information Technology in Education Strategies

5. In line with the global trend of harnessing IT to facilitate learning and teaching, the Government has invested over \$9 billion since the 1998/99 school year in implementing three strategies on IT in Education (ITE) and other e-learning initiatives, including funding support of \$1.9 billion from the Quality Education Fund for e-learning projects. All the strategies have been in line with our education reform that aims to promote life-long learning and the whole-person development of all students.

6. The First Strategy (1998/99 – 2002/03) witnessed significant progress in the provision of IT infrastructure comprising hardware facilities, networks and Internet connection for schools, launching of large-scale professional development programmes to enhance the IT competence of teachers, a growing culture of use of IT by school heads, teachers and students both inside and outside school, as well as increasing support from parents for ITE. The Second Strategy (2003/04 – 2006/07) aimed to enhance the capacities of students and teachers to use IT for learning and teaching with the provision of professional development programmes and e-learning resources. The Third Strategy (2007/08 – present) focused on the human factor necessary for the integration of IT into learning and teaching and the appropriate use of IT. The support services provided for schools aim to empower them to formulate school-based IT in education development plans, to use digital learning resources and IT-related pedagogies appropriately, to cultivate students' information literacy² to make effective, ethical and legal use of information in the e-learning world, and to encourage parents to become effective facilitators of their children's e-learning in the home environment.

7. Besides the above three strategies, the Education Bureau (EDB) has launched a series of major ITE-related initiatives. Schools have been provided with a recurrent Composite Information Technology Grant (CITG)³ since the 2004/05 school year as a source of ongoing funding to meet their operational needs in

² Information literacy is about the capacity of people to recognise their information needs, locate and evaluate the quality of information, store and retrieve information, make effective and ethical use of information and apply information to create and communicate knowledge (UNESCO, 2008).

³ Schools can deploy the grant flexibly to meet various expenses on ITE-related items, including technical support services and upgrading and replacement of IT facilities.

relation to promoting ITE. The total amount of CITG disbursed is \$2.5 billion. Besides, we have spent \$90 million to organise a wide range of professional development activities for educational professionals over the years to enhance their knowledge and skills to promote e-learning. Various strategic e-learning initiatives have also been launched since the 2010/11 school year, including a three-year Pilot Scheme on e-Learning in Schools with a non-recurrent commitment of \$68 million to tap changing pedagogical practices and pave the way for wider adoption of e-learning in schools. The E-Textbook Market Development Scheme (EMADS) implemented since 2012 with a non-recurrent commitment of \$50 million facilitates the development of e-textbooks for use starting from the 2014/15 school year. The Support Scheme on e-Learning in Schools with another non-recurrent commitment of \$50 million was launched in January 2014 to enhance the IT infrastructure of 100 schools. These schools will have WiFi access in all classrooms and acquire sufficient mobile computing devices for using e-textbooks and e-learning resources.

8. The Hong Kong Education City Limited (HKECL) was set up in 2002 under a Government initiative to develop and operate a portal to provide information, resources and services for various stakeholders such as students, teachers, parents and the IT sector, to promote the use of IT in improving the effectiveness of learning and teaching. It has been receiving a recurrent subvention from the Government since its establishment to support its operation and the total amount of subvention disbursed to the HKECL is around \$288 million. Among its services, the EDB One-Stop Portal for Learning and Teaching Resources puts together digital learning resources categorised according to Key Learning Areas (KLA) for easy reference and use by teachers and students. The EdMall provides a platform for vendors to showcase e-learning resources to facilitate sourcing by various users. The HKECL will continue to engage itself in various initiatives of ITE and the curriculum reform.

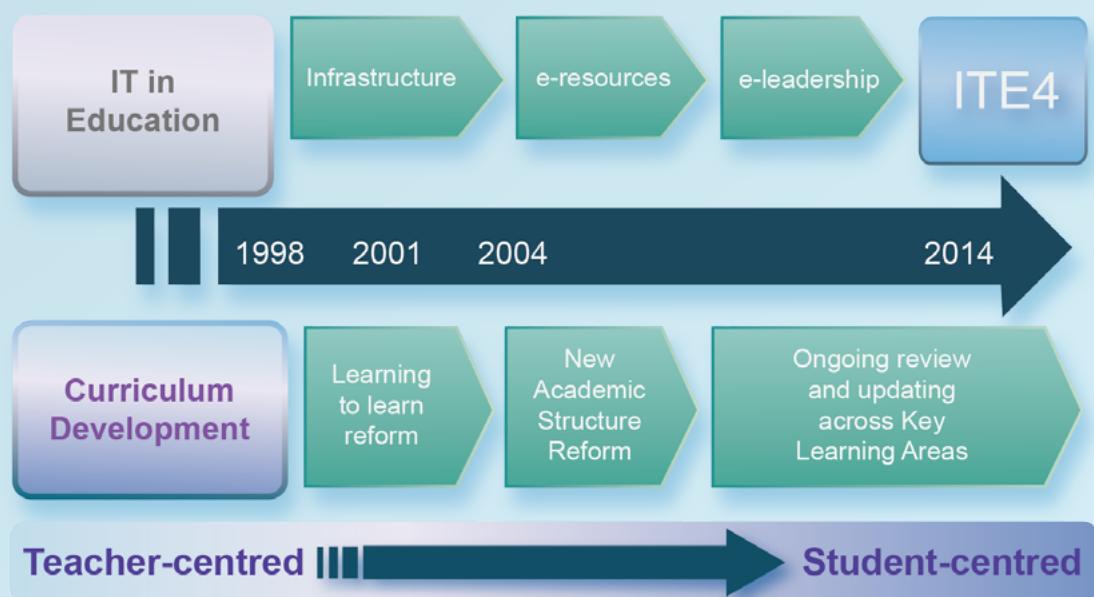
Co-ordinated ITE and curriculum development

9. ITE strategies have been implemented systematically in tandem with the basic education curriculum reform and the New Senior Secondary curriculum and assessment reform focusing on students' learning to learn for lifelong learning and whole-person development. There is a common holistic vision between the two

involving a paradigm shift from teacher-centred learning to student-centred learning as shown in Figure 1 below through:

- the provision of IT contents in Primary General Studies;
- Technology Education Key Learning Area where ICT is one of the six knowledge contexts;
- ICT as an elective subject under the new academic structure (NAS);
- Several IT-related Applied Learning courses as elective subjects under the NAS;
- the infusion of IT skills as a set of generic skills across the school curriculum; and
- “IT for Interactive Learning” as one of the four key tasks for the curriculum reform.

Figure 1
Keeping ITE in step with curriculum development



II. WHAT ARE OUR STRENGTHS AND EXPERIENCES?

IT infrastructure provision

10. Our IT infrastructure has been upgraded over the years and the gross student to computer ratios in the primary, secondary and special school sectors are 4.54:1; 4.21:1 and 1.36:1 respectively, reflecting a high level of student accessibility to

computers in our schools. All the computers are networked and connected to the Internet via broadband. The Internet connectivity in our schools is considered reasonably good, as compared with that in schools in developed economies. However, only a few schools⁴ are equipped with full WiFi coverage with high bandwidth that enables stable access to e-learning resources by multiple devices.

Digital literacy

11. While Hong Kong has not yet reached the top in terms of technological advancement in using IT in education, we are certainly on the right track with regard to harnessing digital means to support learning, as reflected in our students' ongoing improvement in digital reading literacy, for instance, in the Programme for International Student Assessment (PISA) 2012 as shown in Figure 2 below.

Figure 2

The Digital Reading Literacy Achievement of 15-year-olds in Hong Kong and Selected Countries/Economies in PISA 2012⁵

Country/Economy*	Mean Score
Singapore	567
Korea	555
Hong Kong - China	550
Japan	545
Canada	532
Shanghai - China	531
Estonia	523
Australia	521
Ireland	520
Chinese Taipei	519
International Average	497

*Only the mean scores of the top ten countries/economies are shown.

⁴ According to our recent study and surveys, less than 10% of the public sector schools are sufficiently equipped with WiFi connectivity in the classroom to effectively use e-textbooks/e-learning resources. They include (a) Report on the Review Surveys of the Third Strategy on Information Technology in Education (EDB, 2012); and (b) Surveys on IT in Education (January 2012 and July 2013) conducted by the EDB to collect schools' views on e-learning and other relevant data related to ITE.

⁵ Source: <http://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-I.pdf> (P.501, Annex B3-Table B3.I.9)

12. It is worth noting that Hong Kong's 15-year-old students ranked third in the digital reading literacy assessment in PISA 2012, which is two places higher than the fifth position in 2009⁶. The result shows that the performance of our students has been improving significantly over the years due to the resources invested under the ITE strategies, the enhancement of students' higher order skills and the promotion of "Reading to Learn" to enhance students' reading interests and abilities under the curriculum reform. The achievements made are also a testimony to the positive impact of our curriculum reform and the admirable efforts made by our school leaders, teachers, parents and students, which help develop students' life-long learning capabilities and realise their potential.

13. In the 2014 Policy Address, policy support is given to the ITE4 as a measure to let youth flourish and unleash the potential of Hong Kong. The public consultation document on 2014 Digital 21 Strategy released by the Government "Smarter Hong Kong Smarter Living" has set the backdrop for encouraging IT in education. Some key developments provided below show how technology has assisted learning or innovative practices that have emerged in the past few years informing the development of ITE.

Mobile technology

14. The popularity of mobile computing devices has brought about the Post-PC era⁷. Mobile technology not only enables access to various kinds of learning resources on the Internet anywhere and anytime, but also facilitates communication and interaction among students and teachers. While students can conveniently share knowledge and exchange ideas with peers, teachers can play an advisory role forging a learning partnership with students. When IT-enabled learning opportunities are readily available, students will gradually cultivate the habit of taking responsibility for their own learning and become self-directed learners.

⁶ Source: <http://www.info.gov.hk/gia/general/201106/28/P201106280254.htm>

⁷ Post-PC era is a market trend that the vast majority of users will eventually adopt mobile devices, for example, smartphones and tablet computers as the primary computing device instead of personal computers. These devices emphasise portability and connectivity, including the use of cloud-based services, more focused "apps" to perform tasks, and the ability to synchronise information between multiple devices seamlessly (Isaacson, 2011).

15. In fact, we have witnessed cases of how mobile technology and Internet resources are leveraged to create an impact on learning effectiveness on the international as well as local scenes as shown in the examples below:

Application of Flipped Classroom in a US high school

Teachers in the Byron Public Schools in US explored the use of technology for Mathematics learning and teaching in 2010. Teachers prepared the lessons before class with the use of a free online learning management system. To arouse the interest of students, they had their video lectures on the YouTube for viewing before class.

During class, students were no longer passive listeners when teachers were giving presentations; instead, they had to present the concept learned and review the videos. There was engaging student-student as well as student-teacher interaction.

- Flipped Classroom advancing learning at home making more room for classroom interactive learning

Flipped Classroom in Hong Kong

A teacher in a local primary school used to put up presentation slides and assignments on the school's learning management system for students to revise and work on after class. When schools were closed down for weeks due to the outbreak of an epidemic disease, he began to tape his own presentations and put them online for students' viewing as a temporary substitute for class. He realised that students were able to demonstrate their learning in class discussions. A Flipped Classroom was then born, a local case that started off similar to a Khan Academy type of endeavour, i.e. an Internet learning platform with e-learning resources to sustain learning anywhere and anytime.

- Fostering self-directed collaborative learning

The Environmental and Spatial Technologies (EAST) for high schools in US

EAST was a community project which aimed to let students familiarise themselves with technology while at the same time they could contribute to their community and school. The school teachers reflected that they had to guide the students at the beginning as their direct supervisors and mentors but they gradually became the observers and supporters when students were engaging in their own work. Direct guidance was given again on self-evaluation and learning reviews when the students had finished the project.

Students had to utilise necessary technology to generate ideas for their own project which would help the community / school and they had to deliver these outcomes in the EAST Conference. Learning was no longer confined to the classroom or bound by the timetable. Students were given opportunities to acquire learning experiences at their own pace, at their preferred time and space. Furthermore, communication in the classroom became more efficient and effective with student-student and student-teacher interactions much better attained.

- Fostering creativity by empowering students to be self-directed learners

Creative writing

To inspire students to practise creative writing in the Chinese Language Education KLA, teachers first set the scene with an authentic learning context, i.e. the real problems of an “old” district where the school was located. Students were assigned to work in groups. They could decide on the kind of shops/people to interview to collect authentic data for composing their reports on the distinctive and cultural reflections of the district concerned.

Students would use a search engine to locate shops to visit, and use Google Map to locate and plan the route for the field trip, as well as to collect background information on the district.

During the field trip, students collected data with mobile computing devices. They also made use of the learner progression and interaction database provided by the school learning management system to conduct self- and peer- evaluations. Finally, each student had to compose their own piece of writing after considering the feedback and remarks given by peers and teachers.

Students engaged in collaborative learning had been stimulated to do self-directed learning, which, in turn, facilitated inquiry and developed creativity.

- Catering for learner diversity by arousing students’ learning motivation

Engage students in active learning to address learner diversity

Teachers had designed learning modules on English Language for S1-S2 students. Together with the e-books and relevant lesson plans developed by the content developer, they trialled the modules in class with students of different levels of ability through a free educational social network platform (Edmodo).

During the learning process, students actively used the mobile computing devices and were motivated to create, upload and share their works through various cloud services. They also worked in groups to collaborate and share their ideas and thoughts both on-line and off-line. The language works produced, such as poems, were in digital and multimedia format and the contents were far more enriched than their previous paper and pencil work. Students’ learning outcomes were significantly enhanced.

Learning partnership

16. In a student-centred learning environment, the application of IT helps transform the roles of students and teachers as summarised in the following table:

Teacher	Student
• From lecturer to advisor, learning facilitator and resource provider	• From passive receiver to self-motivated learner and knowledge constructor
• From answer provider to questioner	• From content receiver to explorer and problem-solver with multiple perspectives
• From solitary teacher to learning team member	• From passive learner to interactive and collaborative learner
• From sole assessor of students to facilitator of wide-ranging self- and peer assessments	• From passively-assessed learner to self- and peer-assessing learner
• From teaching environment controller to fellow learner sharing learning with the student	• From student in classroom to learner inside and outside classroom
• From teacher merely attending to the common learning needs of students to teacher responding to student diversity as well	• From knowledge holder to knowledge user

17. With the help of technology, students have more opportunities for interaction, active participation and engagement. In such a learning environment, they can take learning more into their own hands and are capable of making greater achievements. The Flipped Classroom, the EAST model and other cases mentioned above illustrate how IT can be leveraged as a catalyst for self-directed, collaborative and performance-based learning. Students are able to select appropriate technology tools to set their learning goals, to obtain, analyse, synthesise and assimilate information, and to evaluate and revise their learning paths with the support of their teachers. These skills will enable our next generation to thrive in the 21st century. The technologies concerned should be widely integrated into the school curriculum and adopted in our school community.

E-Learning in schools

18. The interim findings of the research study on the Pilot Scheme on e-Learning in Schools⁸ have identified the following benefits for students and teachers showing that we are promoting ITE in the right direction. The benefits identified are:

For students

- Enhancing motivation and interest in learning;
- Opening up the learning space by generating contexts for learning, such as learning in authentic contexts and interactions with peers, teachers and experts; and
- Improving information literacy.

For Teachers

- Trying out assessment rubrics for students' self-assessment and peer assessment as part of self-directed learning;
- Capitalising on technology to promote interactivity and e-learning pedagogies such as collaborative and enquiry learning, group discussion and project-based learning;
- Building learning networks among schools for professional sharing of experiences in e-learning implementation, lesson co-planning and observations; and
- Catering for students' individual differences with different teaching strategies as making use of multi-media presentations to enhance understanding, classroom games and artwork productions to motivate learning and e-learning resources to enable learning at individual paces.

'Learning to learn' curriculum reform

19. Proficiency in IT skills is one of the Seven Learning Goals in Hong Kong's curriculum reform, which started more than a decade ago. The implementation of the curriculum reform has informed us that more effort is needed to make use of IT to enable students to develop higher order learning skills and to gain experiences in reporting and sharing of experiences, reflection on learning processes, problem-solving, enquiry-based learning, and collaborative learning.

⁸ A research study has been conducted on the Pilot Scheme on e-Learning in Schools since its implementation in late 2010 to investigate, among others, the different e-learning solutions of the pilot projects, the effectiveness of e-learning with good school practices, and to recommend strategic directions for the implementation of e-learning in Hong Kong. The research study is to be completed by the end of 2014. An interim report was submitted by the responsible research team in October 2013 (http://e2.cite.hku.hk/tc/resources/Ite2013/20131214_Expo.pdf). Only English version is available.

20. Besides, research studies suggest that effective deployment of IT in learning and teaching depends not only on infrastructure, administrative planning and technical support, but also on school curriculum policy and leadership.

21. The curriculum reform emphasises the development of generic learning skills and learner-centred learning approaches/strategies, which will enhance students' ownership of their learning. The figures below provide a general picture of the acquisition and application of such skills and strategies among our students. The new strategy on ITE will work in synergy with the curriculum reform to reinforce the development of such skills, which are now becoming key competencies in the business world.

Figure 3

Comparing generic skills acquired by students in 2006 and 2011⁹

Generic Skills	2006	2011
Communication skills	70.2%	80.7%
Critical thinking skills	57.8%	72.1%
Creativity	61.2%	66.5%
Collaboration skills	76.0%	79.4%
IT skills	86.8%	91.5%
Problem-solving skills	58.2%	77.5%

⁹ Source: Survey on the curriculum reform 2006: evaluation report (EDB 2007) and New Senior Secondary Curriculum Implementation Study (EDB, 2012).

Figure 4

Learning approaches and strategies among students in 2011¹⁰

Learning approaches/ strategies	2011
Enquiry learning opportunities	61.8%
Discussion groups	80.0%
Report and share own learning processes and outcomes	60.8%
Nurturing reflective ability to think in depth	83.8%
Co-construction	61.2%

Self-directed learning and generic skills

22. Broadly speaking, self-directed learning (SDL) is an umbrella notion¹¹ that encompasses a family of learning processes in which the individual takes the initiative and the responsibility for what occurs and the individual selects, manages, and assesses his or her own learning, which can be pursued at any time, in any place, through any means and at any age. It enhances students' motivation to learn and cultivates among them a positive attitude towards self-learning. It also promotes students' self-esteem, critical reasoning, problem-solving abilities and other higher order thinking abilities. In the context of using IT, SDL generally has four key characteristics:

- Learners' control;
- Learners' self-management;
- Personal autonomy; and
- Tendency of self-learning – the independent pursuit of learning outside formal settings.

¹⁰ Source: New Senior Secondary Curriculum Implementation Study (EDB, 2012).

¹¹ Notions related to 'self-directed learning' include self-regulated learning, self-learning, and independent learning. Each has their specific features to enhance the learning autonomy of students through building a sense of agency in their learning process.

23. In our school curriculum, the experience of SDL should play an important role in facilitating the acquisition of generic skills, for example, problem-solving, self-management, critical thinking, creativity and collaboration. ITE4 would provide the opportunity to foster the development of such skills, thus cultivating students' life-long learning and learning to learn capabilities.

24. It is also important that our students should develop a keen interest and capabilities to do problem-solving and enhance the quality of their daily work with the use of technology. As part of the ongoing curriculum renewal, the KLAs (primary and secondary) should conduct timely updating of the curriculum to respond to the latest developments in IT, with inclusion of innovations and exemplars for raising the quality of learning among students.

25. We are not without challenges. The following limitations are identified in the pilot projects and reflected in the feedback gathered:

- Inadequate hardware facilities such as limited WiFi coverage and bandwidth and insufficient mobile computing devices in schools;
- Inadequate structured and long-term planning for the implementation of e-learning whereas most high performing countries have an IT plan;
- Insufficient know-how on how to use IT to improve learning and teaching effectiveness;
- Concerns on health issues such as eyestrain from using computing devices for extended periods of time; and
- Lower motivation of students in using e-learning resources when compared with existing leisure-oriented online games, over-emphasis on IT competitions for a small group of interested students.

III. WHAT ARE THE OVERARCHING PRINCIPLES?

How to guide the way forward?

26. In view of the lessons learned on the journey experienced, we propose adopting the following overarching principles and a holistic approach at the system level and at the school-based level to implement ITE4.

- ***“It has to be learner-focused”***

It is a consensus that “being learner-focused” remains the cornerstone and technology is a means of supporting the “Principles for Effective Pedagogy”¹² with the following essential teaching strategies:

- ⇒ Students could learn through active knowledge construction and social interaction with teachers and others through IT, which provides a gateway to the world of immense knowledge on the Internet and interactions for social construction of knowledge;
- ⇒ Enable our students to become life-long learners in its broadest sense;
- ⇒ Engage learners with valued forms of knowledge;
- ⇒ Recognise the importance of learners’ prior knowledge, learning experiences and cultural background;
- ⇒ Enable scaffolding¹³ of student learning;
- ⇒ Promote the active engagement of the learner;
- ⇒ Foster both individual and social processes and outcomes; and
- ⇒ Recognise the significance of informal learning.

¹² Source: <http://www.tlrp.org/themes/themes/tenprinciples.html> (TLRP, 2009)

¹³ When students encounter obstacles during the learning process, the teacher needs to adapt the learning materials according to the different learning needs of students for the enhancement of their learning effectiveness. The teacher will be gradually fading their support to let students learn independently. (Sherin, B., Reiser, B.J. & Edelson, D., 2004)

- ***“Stepwise planning is crucial”***

Schools vary in terms of their readiness and the pace at which to undertake strategic planning, to develop and use their IT infrastructure, and to promote e-learning. As one size never fits all, we support the promotion of ITE at different paces among our schools.

- ***“Ongoing curriculum renewal is the key”***

Timely renewal of the curriculum, together with its related pedagogical approaches, sets out what and how students should learn. The emphasis is to enable learning that responds to the changing world (such as the need for programming), harnesses technology that helps open up the space of learning and provide equal learning opportunities to cater for learner diversity, including non-Chinese speaking students, gifted/talented students, and students with special education needs.

Curriculum development or ‘renewal’ is a dynamic process in which different stakeholders take part. Curriculum is the medium for IT to add value to our existing repertoire of effective learning and teaching strategies that are linked with a wide range of contemporary learning theories such as cognitive learning, social learning, experiential/situated learning, project-based learning, problem-based learning, web-based scientific enquiry, and knowledge building.

- ***“Professional capacity matters”***

Professional capacity is at the heart of effective learning and teaching. In this light, teachers’ professional understanding, attitude, capacity and the availability of room for further development are essential in propelling the desirable paradigm shift in our classrooms with the help of IT. This is also illustrated in some research results that effective learning depends on the learning of all those who support the learning of others¹⁴.

¹⁴ Source: <http://www.tlrp.org/index.html> (TLRP, 2009)

- “**Partnerships enhance sustainability**”

Building partnerships is an effective vehicle to enhance ownership among the stakeholders concerned, and, in Fullan’s term, ‘widespread leadership’¹⁵ in the change process, in which leaders will influence other leaders to carry out the core agenda in a sustainable manner.

Working in collaboration with other sectors including local tertiary institutions, non-government organisations (NGOs) and the IT sector to form schools’ community partnerships would enable each to benefit from others’ strengths and learn from one another, such as how best to nurture the gifted in schools; and

Parents, our major stakeholders, should also be engaged to enhance their understanding of the benefits and limitations of e-learning for their children.

IV. WHAT ARE THE RECOMMENDED ACTIONS?

Goal of ITE4

27. Student learning is central to ITE4. The goal of ITE4 is to unleash the learning power of all our students to learn to learn and to excel through realising the potential of IT in enhancing interactive learning and teaching experiences. We aim to strengthen students’ self-directed learning, their creativity, collaboration, problem-solving and computational thinking skills, as well as ethical use of IT, in an enhanced IT environment, with schools’ professional leadership and capacity, as well as the support from community partnerships.

¹⁵ In M. Fullan’s (2012) article, ‘Transforming schools in an entire system at a time’ posted in McKinsey & Co website

Proposed Actions

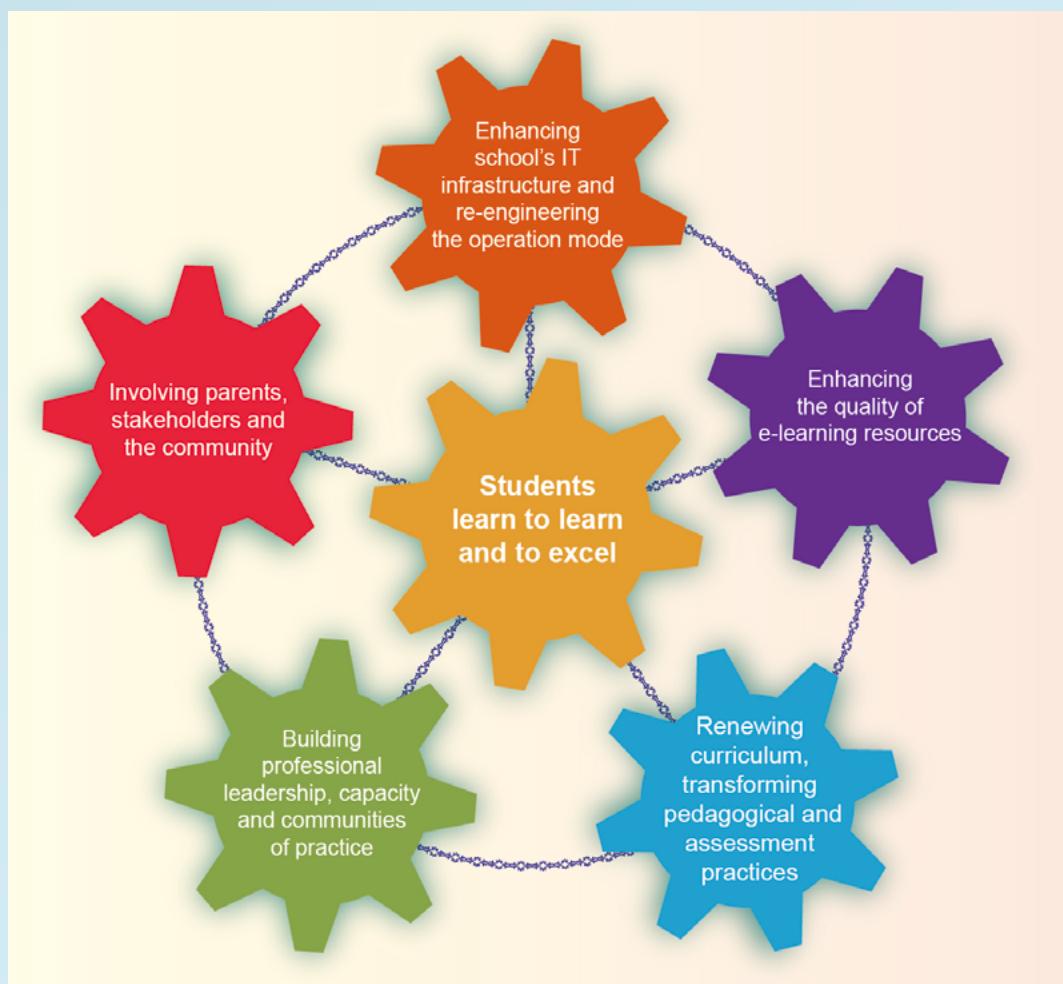
28. We propose the following five actions to achieve the goal of ITE4 :

- (1) Enhancing schools' IT infrastructure and re-engineering the operation mode;
- (2) Enhancing the quality of e-learning resources;
- (3) Renewing curriculum, transforming pedagogical and assessment practices;
- (4) Building professional leadership, capacity and communities of practice; and
- (5) Involving parents, stakeholders and the community.

Figure 5 shows the interconnection of the five actions.

Figure 5

Key Actions for ITE4



Action 1 - Enhancing schools' IT infrastructure and re-engineering the operation mode

1.1 Providing a WiFi campus for all

29. The existing network of most public sector schools is no longer capable of reaping the full potential of IT in transforming learning and teaching. With the proliferation of mobile computing devices and their increased use for learning, the Government and the public share the view on the necessity for the establishment of a robust WiFi infrastructure to cover all classrooms of the school premises. Owing to the different conditions and paces of schools, we propose to accomplish this by phases incrementally over a period of three years ending in the 2017/18 school year. In fact, the Support Scheme on e-Learning in Schools launched in January 2014 that involves 100 schools is taken as the pioneering phase of this endeavour. The phased implementation allows schools to complete the work at their own pace and address their own priority.

1.2 Adopting a diversified service model

30. To develop a robust WiFi infrastructure in schools is a highly technical task and would require a recurrent investment to maintain and upgrade the infrastructure. The technical expertise required is way beyond the capability of teachers and the technical support personnel in schools. The Support Scheme for e-Learning in Schools has pioneered an out-sourcing model whereby schools only need to pay a subscription fee for the service of construction and maintenance of a stable and high capacity WiFi infrastructure covering all classrooms. Teachers will be relieved of the burden to handle the construction and maintenance or the upgrading of the WiFi infrastructure. Also, the experience will definitely help shed light on how to scale up the process.

31. With wider deployment of the aforesaid “WiFi-as-a-service” model, the IT industry will become more ready to provide other total solution services including cloud computing to better serve the IT needs of schools. Cloud computing can enable schools to access a wide array of hosted services without the need to maintain their own servers and handle the daily operations such as backup, system

maintenance and security monitoring. Cloud-based services will allow schools to easily keep up with the state-of-the-art technologies without imposing an extra burden on teachers. It will also help relieve the difficulty in hiring and retaining highly skilled IT technicians, which has been affecting schools for some time.

1.3 *Using mobile devices wisely*

32. “Bring-your-own-device” (BYOD) has become common in the higher education sector and is being practised in some schools. Looking ahead, with e-learning becoming more and more prominent in schools and continuous reduction in the cost of mobile computing devices, we anticipate that BYOD will become popular in schools. As such, schools should seriously re-evaluate the need to maintain clusters of desktop computers in designated rooms. Savings from the maintenance of these computers as well as the servers can be used to buy cloud computing services.

33. However, schools may need to acquire some of these mobile computing devices as a supplement or for development purposes. We propose to disburse a one-off grant to schools for the acquisition of mobile computing devices. The recurrent cost for replacement of these devices will be covered by the increase in the recurrent subsidy to public sector schools.

Questions for consultation:

- Should schools adopt IT and e-learning at different paces?
- Should there be flexibility in the timeframe for schools to build the WiFi infrastructure?
- What are the merits and difficulties in using the subscription model to build WiFi infrastructure?
- What experiences can be referred to regarding the adoption of the “WiFi-as-a-service” model?
- Can cloud-based services reduce the workload of the technical support staff in schools?
- How many and what kind of mobile computing devices should be acquired by schools to facilitate e-learning?
- What measures need to be put in place prior to the adoption of BYOD?

Action 2 - Enhancing the quality of e-learning resources

2.1 Developing an e-textbook market

34. The EDB launched EMADS (Phase 1) in June 2012 with the objective of facilitating and encouraging partnerships with potential and aspiring e-textbook developers to develop a wide range of e-textbooks in line with our local curricula. Phase 2 of the Scheme was subsequently launched in August 2013. The e-textbooks developed under Phase 1 are to be available for use starting from the 2014/15 school year and those under Phase 2 starting from the 2015/16 and 2016/17 school years.

2.2 Leveraging global e-learning resources

35. Besides locally developed e-textbooks which are curriculum-based, many other high quality e-learning resources and platforms developed locally or overseas are available to support specific and diversified learning needs. In this light, we propose making use of the platform of the HKECL to acquire quality e-learning resources from local and overseas developers with a view to enriching the pool of high quality and readily available e-learning resources for use by both teachers and students. Through this initiative, the HKECL can coordinate evaluation, acquisition and licensing of e-learning resources, and to support implementation and adoption on a large scale, so that the cost and overhead for acquiring and using e-learning resources can be lowered in the long run.

2.3 Enriching the free resources on EDB One-Stop Portal

36. We will continue to enrich and update the free learning and teaching resources available on the EDB One-Stop Portal through the HKECL website. The HKECL will also continue to expand the Resource Depository and provide more online learning packages by partnering with schools and other organisations, with a focus on addressing the unique needs in Hong Kong, for which suitable e-learning resources are not readily available.

2.4 Sharing of resources by teachers

37. To further enrich the pool of local learning and teaching resources, we have encouraged schools to adopt Creative Commons (CC) in publishing their works. CC licences are not intended to replace traditional copyright licences, but creators could release their works under a more permissive licence so that their works can be re-used, republished, remixed, or shared freely and broadly by a wider public.

The CC licence also provides an internationally-recognised vehicle for school teachers to adopt and share resources among themselves and with others. To support this, the EDB will further promote the use of CC through collaboration with community partners. We will help develop a community of practice to engage teachers in the adoption of CC licences.

2.5 Enabling Single Sign-on

38. The future e-learning scenario will be personalised, meaning that each learner will have a personal record in the system and the learning data can be analysed and reported.

39. Providers of e-learning solutions need to create accounts for students in schools. The task has to be repeated a hundred times if there are a hundred schools using the system. In a similar fashion, a school using e-learning platforms from 20 suppliers will need to handle the student accounts 20 times. Subsequent login and password problems also require substantial operational support efforts. Tedious account administrative work will be a barrier for publishers, schools and students in adopting e-learning on a large scale.

40. A Single Sign-on (SSO) service for all students in Hong Kong can help streamline the whole process. If each student is provided with an account for accessing e-learning, including network access, platform access, e-book access and so on, the work for service providers, schools, parents and students will be much simplified and the future support cost for handling tasks associated with user accounts and passwords can also be much reduced.

2.6 Integrating e-learning platforms

41. In addition to SSO, schools will also need to access the students' learning data from various e-textbook and e-learning platforms. Schools have a certain kind of Learning Management System (LMS) at this moment to support e-learning, but such systems are not readily capable of handling the learning activities and data provided by a third-party platform. There is currently no standard way of how the learning data can be exchanged between the school and the platforms. Platform providers have to develop their own tools and mechanisms, and schools also need to use different tools and mechanisms in order to retrieve the data from different systems.

42. To streamline the processes and to facilitate the handling of e-learning data in the future, an online integration services platform will be set up by HKECL to provide SSO services and to enable exchange of learning data between school-based LMSs and other online learning content platforms. Such integration would be extended to support e-textbook access from mobile devices so that a holistic integration can be achieved for e-learning activities via web and mobile devices.

Questions for consultation:

- Would proposals 2.1 to 2.4 result in the production of high quality e-textbooks and teaching resources?
- Would proposals 2.5 and 2.6 provide convenience for teachers/students?
- What role can the HKECL play in ITE4, for example, how to make use of EdMall?
- What support is required to help schools source and select useful e-learning resources?

Action 3 – Renewing curriculum, transforming pedagogical and assessment practices

43. To formulate the ITE learning goals for students and the school sector, there is nothing more important than envisioning the future. In tandem, the renewal of the school curriculum and the development of effective pedagogical and assessment practices have to be ongoing processes.

3.1 Articulating clear learning objectives

44. In connection with the goal of ITE4, we should present and align the following priority learning objectives to empower our students to learn to learn, to unleash their learning power and to excel in all education initiatives related to student learning through:

- Self-directed learning;
- Collaborative learning of reading and writing through online tools;
- Problem-solving, creativity, computational thinking through design and coding to tackle complex problems; and
- Ethical use of IT.

3.2 Enhancing problem-solving and programming-related skills

45. One purpose of incorporating IT in the curriculum is to provide the knowledge base necessary for students, as life-long learners, to keep pace with the latest technology-driven learning revolution. We will continue to enhance problem-solving skills through equipping students with programming-related capabilities (e.g. computational thinking, modelling and testing, and logical analysing). The provision of programming-related capabilities in Key Stage (KS) 3 will help students develop a logical problem-solving mindset through the use of IT. To align with the most recent promulgation of the enriched Technology Education Key Learning Area (TEKLA) curriculum at the junior secondary level and the senior secondary Information and Communication Technology subject, we propose the following engagement of good school practices in teaching programming:

- We will explore ways and best practices to train students in structured and logical thinking through mandatory programming studies;
- Promotion of problem-solving and programming-related skills under existing Science and Technology initiatives in basic education; and
- We will explore different entry points of learning within relevant KLAs (e.g. Science Education and Technology Education) in the curriculum to develop students' problem-solving and programming-related skills and knowledge (e.g. fair testing, design cycle and logical thinking) progressively towards senior secondary levels. Our aim is to nurture students' disposition and ability to solve daily life problems, from personal to community levels.

3.3 Applying IT skills across school curricula

46. With a view to enhancing information literacy among students in meeting the challenges of the rapidly changing digital world, we will continue to infuse the four priority learning objectives with more IT skills, including digital reading skills and online collaborative skills across the curriculum. We will also provide different life-wide learning experiences and commit ourselves to the ongoing curriculum review/revision of the ICT components of the enriched TEKLA curriculum, New Senior Secondary (NSS) ICT subject curriculum, and the relevant IT part of the

existing Primary General Studies Curriculum, where appropriate. While conducting regular curriculum revision across KLAs, we would make conscious efforts to sustain discipline or subject skills such as the handling of equipment in laboratories, handwriting, calligraphy and art.

47. We will continue to update and strengthen IT skills in appropriate Applied Learning courses to keep pace with the rapid developments in relevant industries. Besides, with a view to nurturing and developing IT talents, we will enhance school support to nurture students' interest in IT and their continued engagement in IT-related careers through initiatives and collaborative partnership schemes on the promotion of the development and achievement of the IT industry.

3.4 Promoting an e-learning repertoire

48. As revealed from other countries' experience in introducing e-learning in schools, not all e-learning tools or strategies are welcomed by practitioners. For example, as shared by a group of teachers in the United Kingdom, a science learning software, which has good in-depth animated simulation to illustrate 3-dimensional structures of DNA, does not work well when demonstrating magnetic field as it was found that the experimental use of real magnet and iron filings is a better illustration in classrooms. Such an example illustrates the importance to build *collective professional insights* among teachers in building a wider repertoire of e-learning pedagogy. Measures are as follows:

- We will keep abreast of the latest pedagogical developments, with an aim to exploring what works and what may not work in classrooms. Pedagogical knowledge will be co-constructed in established networks or teacher communities (assisted by existing IT platforms, e.g. HKECL) through actions and discussions among professionals to improve classroom teaching. Unlike former IT strategies, it would NOT only focus on introducing e-learning pedagogy, but also encourage teachers to develop own repertoire and sense of discernment with respect to the use of effective content pedagogy in their subject specialisms, both with and without IT enhancement; and

- We will enhance all teachers' understanding of e-learning pedagogy across KLAs so as to enable them to serve as facilitators and activators to facilitate students' use of IT for effective subject learning. We will promote active student learning with the use of e-learning pedagogy across subjects/KLAs, such as strategies for building self-regulated reading habits, developing students' information literacy and promoting assessment for/as learning. In order to encourage teachers to use e-pedagogy in their subject teaching, updating will be conducted as part of the ongoing curriculum review cycle in each KLA.

3.5 Using e-assessment for student learning

49. Schools may consider using e-assessment more widely. There are some well-developed e-assessment platforms and diagnostic tools that would provide instant feedback, e.g. the online Student Assessment on BCA. It is much easier to administer assessment and conduct analysis with such tools than with pen and paper tests. Some tools can use statistical and psychometric techniques to improve test design and understanding of the student diversity (e.g. the Assessment Quality-assurance Platform (AQP) of HKEAA and the SP Xpress). It is expected that simple e-assessment tools will be a feature of e-textbooks to provide tools to keep track of student progress. e-Assessment item banks can support teachers in designing their tests and using assessment for learning. Efforts will be made to develop suitable e-assessment item banks and platforms to enable schools to fully benefit from e-assessment.

3.6 Engaging students in IT-related life-wide learning

50. We will encourage students to participate in related life-wide learning activities and competitions, both local and international, so as to stimulate students' interest in computing science.

51. The Government will encourage partnerships with the community (e.g. the IT sector, tertiary institutions and NGOs) to provide enrichment programmes for young IT-gifted students being identified especially in secondary schools which are outstanding in promoting ITE for the purpose of cultivating future IT professionals and even entrepreneurs to meet the development needs of Hong Kong as a digital society.

3.7 Exploring IT-related career paths

52. With the support of IT in education, our students are better equipped for their further studies in IT-related fields and their future career.
53. IT and IT-rich school environments should provide opportunities for the development of key generic skills, such as communication, creativity, problem-solving and IT skills, in addition to the development of a positive collective mindset that embraces ongoing changes and challenges ahead. Students can be well-equipped for their further studies of IT in tertiary education, use of IT as a tool to support disciplinary learning, advanced studies of IT to obtain industrial recognition, and use of IT to handle a wide range of tasks in the workplace.
54. With IT knowledge, students can choose to study IT-related fields in tertiary education, such as Computer Engineering, Computer Science and Information Engineering, and further their study to obtain industrial recognition, such as Cisco Certified Network Associate (CCNA), Microsoft Certified Solutions Expert (MCSE), Certified Information Systems Security Professional (CISSP), and Oracle Certified Professional, Java SE 7 Programmer (OCPJP), which will give them the edge to pursue a career in IT-related sectors, such as system development, networking, multimedia entertainment and computer security.

Questions for consultation:

- Can programming as a curriculum topic help develop students' logical problem-solving mindset? Why?
- How can teachers make use of IT in different subjects to enhance learning outcomes and to foster development of self-learning, collaboration and creativity among students?
- How to enable students to use IT in an ethical way?
- How can IT help cater for learners' diverse needs arising from different learning abilities, strategies, ethnic groups or students with special education needs?
- How can IT help promote assessment literacy?

Action 4 – Building professional leadership, capacity and communities of practice

4.1 Empowering e-leadership

55. School leadership is essential to successful implementation of new initiatives. We have a good local school case below illustrating how leadership has brought about the transformation.

Committed school leadership

The school heads of five primary schools under the same school sponsoring body shared the same goals and joined hands to develop the e-materials and teaching strategies for Chinese Language (Putonghua) and General Studies.

One school head who served as the coordinator of the cluster project, planned and scheduled regular meetings to review the e-learning resources developed together with all school heads, subject panel teachers, the partner publishers and tertiary institutions. Besides, regular class observations were conducted among the school teachers involved in the project to foster professional exchanges.

The case above highlights the importance of school leadership in sustaining transformation.

56. The role of the school leaders (principal, vice-principal/teachers responsible for curriculum planning) in enabling whole school adoption of e-learning can be summarised as follows:

- Integration of IT into curriculum planning and strategy for curriculum delivery in the school development plan, including the ethical and healthy use of IT;
- Effective school cultural changes among stakeholders (including school management, teachers and parents in particular) through consultation, support and development;
- Formulation of school policy and measures to address the impact of BYOD;
- Engagement of middle managers (e.g. curriculum leaders, panel chairs in different KLAs) in curriculum planning, infusion of e-learning, sharing practices;
- Provision of continuous professional development opportunities for teachers, including the development of communities of practice (CoP) within the school and across the school community; and
- Provision of the necessary IT infrastructure with appropriate technical and programme management support for scalable and sustainable development.

57. To enhance professional leadership and capacity of school leaders and teachers, different modes of professional development programmes (PDPs) would be conducted to cover the following:

- Dissemination of school policy and support measures to teachers, parents and students;
- Strategic planning for whole-school adoption of e-learning (including ethical and healthy use of IT);
- Experience sharing on formulation and implementation of school-based e-learning development plans and successful practices, e.g. pilot project experiences and in-depth case studies; and
- Site visits to schools to develop a good understanding of other schools' practices and to form school networks.

The programmes would be principle-led and supported by hands-on sessions for the acquisition of basic knowledge and skills. To cater for the different paces of our schools, we will organise the programmes for all school principals and a number of middle managers for each school by the 2016/17 school year or earlier.

4.2 Providing a self-learning web-based tool kit

58. A web-based Resource Pack would be developed to support schools to tailor-make their own plans in accordance with the development priorities and needs of their school development plan. Drawing on the authentic experiences of the participating school leaders, we will refine the web-based tool kit by the 2015/16 school year to support all schools in devising their school-based e-learning development plans.

4.3 Enhancing professional development of teachers

59. Successful implementation of whole-school e-learning depends on whether teachers perceive and react to it as a favourable and viable mode of learning for students. We propose to organise a series of PDPs at the generic and KLA-specific levels. The programmes at the generic level aim to enhance teachers' information literacy and help explore the potential of using IT for the enhancement of learning and teaching, and the development of self-directed learning, collaboration and problem-solving skills with the help of various IT-enhanced pedagogical approaches. Moreover, informative sessions on the opportunities offered by IT for learning and teaching and hands-on sessions on using mobile computer devices will be organised.

60. At the KLA/subject level, the PDPs would highlight specific pedagogical content knowledge or relevant innovative approaches that work for specific topics within the KLA/ subject curriculum framework, as well as the application of SDL.

4.4 Rendering support services

61. Other capacity building initiatives include onsite school support and district-based PDPs aiming at empowering teachers to adopt or adapt good pedagogical and technical practices in their schools. Teams of professional staff of the IT in Education Section will continue to organise PDPs in partnership with teaching professionals drawing on the experience gained in schemes such as Centres of Excellence on ITE, Pilot Scheme on e-Learning, Partner Schools Scheme under the EMADS and Support Scheme for e-Learning in Schools.

4.5 Building communities of practice

62. We also encourage school teachers to build communities of practice (CoP) within schools where teachers of the same subject help one another to use IT tools and implement related practices. The learning and professional growth that take place in the CoPs will be supported by a critical mass of teachers with relevant experience and expertise. Another mode of support is to form CoPs across schools. In fact, such CoPs have been formed, for example, on Liberal Studies to explore and update e-materials for learning and teaching while teacher librarians in secondary schools have formed learning networks to promote information literacy and reading via an e-learning platform among students and the wider community of stakeholders.

Questions for consultation:

- What are the perceived challenges for the school leadership to plan for the adoption of IT and e-learning for the whole school?
- What are the specific knowledge and skills required for the school leadership and teachers to promote and develop use of IT and e-learning?
- What is the role of teachers when students are highly motivated to learn with the aid of technology?
- What support is required for schools to facilitate students to make good use of e-learning to develop the abilities of learning to learn and to excel as well as to enhance SDL, collaboration and creativity?
- What are the key factors for communities of practice to work effectively between teachers of the same school and from different schools?

Action 5 – Involving parents, stakeholders and the community

5.1 Communicating with parents

63. To reach out to parents, we will launch a series of promotion videos on the issues related to e-learning and e-safety. We will facilitate early guidance for their children to make good use of IT in learning and make ethical and legal use of IT. Parents' information literacy should further be strengthened on issues related to e-safety, copyright, healthy use of mobile computing devices, and cyber-bullying. With these issues being tackled, parents may feel more assured to encourage and support their children to take on e-learning and to excel.

64. Parents have much concern about the healthy growth of their children. Children may be exposed to a variety of possible adverse influences on the Internet that may affect their physical and psychological health. To address these issues, the EDB will work with relevant Government departments and other community partners to provide advice on appropriate use of mobile computing devices for parents and students.

65. Children at kindergarten are expected to have a happy and enjoyable childhood. They are curious and like to explore the world and some parents may provide mobile computing devices for their children. To support these parents in giving proper guidance for their children, we will help provide guidelines according to the age level of the children.

5.2 *Working with stakeholders and the community*

66. To strengthen support for individual parents, we will collaborate with the federations of parent-teacher associations in districts so that they would work closely with schools on supporting their children in e-learning in an appropriate way. We will work with community organisations and NGOs to provide relevant services to students/schools on healthy and ethical use of e-learning.

67. With the world-wide trend of BYOD in education, our schools should formulate relevant measures on the better use of students' own mobile learning devices. The EDB will provide information for schools' reference on how to set guidelines for both parents and students. Schools will also be encouraged to provide training for parents on the use of mobile computing devices in the context of education.

68. We will work in collaboration with other sectors, including the IT sector, local tertiary institutions and NGOs, to form community partnerships which will enable each to learn from each other and help foster cooperation to nurture gifted young IT-talents in our schools.

5.3 Leveraging community resources

69. Schools have adopted IT in education and e-learning over the years at different paces and in ways that suit their contexts and needs of their students. While the Government has provided schools with recurrent resources commensurate with their size and needs, schools may need to respond readily to the opportunities brought about by IT and to cater better to the needs of their students. With effect from April 2014, “Using e-learning (IT) for effective learning” has been included into the priority themes for the application of the QEF. Detailed information is available at <http://www.qef.org.hk/>.

Questions for consultation:

- What do parents expect to know about e-learning?
- What do parents think of BYOD?
- How to further enhance the capacity of parents to provide guidance for their children?

V. WHO WOULD BENEFIT?

Students would

- be motivated to learn with the help of IT, which would meet their diverse learning styles, strategies and interests;
- enjoy the convenience and benefits of mobile learning through campus WiFi access;
- have easy access to networks, e-resources and various online services including world-class resources and real-time information;
- engage in face-to-face collaboration and communication with a much wider learning community of teachers and peers;
- develop themselves into self-directed learners with better problem-solving and collaboration skills, computational thinking and creativity through more interactive learning experiences;
- become capable digital natives and learn to make the best use of technology to support their own development and learning and to be ethical users of IT; and
- realise their potential and develop career interests in IT.

Teachers would

- spare themselves from the need to use computer rooms when all classrooms have WiFi coverage. They would also enjoy a much more convenient environment to promote e-learning effectively;
- spare themselves from the chore of fixing technical issues when the new service model for upgrading schools' IT infrastructure is in place. Besides, they would not be troubled by uncertainties arising from the long-term maintenance and upgrading of school IT infrastructure;
- have easy access to networks, e-resources and different online services with one single account;
- have a much wider range of e-textbooks, e-assessment tools, e-resources and online platforms for teaching. Instant feedback and innovative teaching approaches such as Flipped Classroom would help teachers make the most effective use of classroom time;
- share knowledge in adopting e-learning and advance professionally through the establishment of CoPs; and
- enrich their repertoire of e-learning pedagogy through professional development programmes, establishment of CoPs and reflective practices.

Schools and school leaders would

- plan the maintenance and upgrading of school IT infrastructure according to their own pace and context;
- have greater confidence in planning to adopt e-learning according to their context;
- make use of better connectivity among different e-learning platforms and higher compatibility across computing devices to facilitate data exchange and management; and
- enhance their capacity through engagement with various stakeholders and the community at large.

Parents would

- have easier access to support from community organisations when these organisations could offer such support services through a more standardised, simplified and integrated infrastructure;
- be provided with guidelines to support their children in the healthy, effective and ethical use of IT in learning and in their daily life; and
- save time and efforts to identify additional learning resources for their children when more free quality learning resources and tools are available.

Hong Kong as a whole would

- foster collaboration among schools, the IT and business sectors, professionals, community organisations, tertiary institutions and parents to contribute to education endeavours;
- develop itself towards a knowledge-based society as our students acquire the skills to become life-long learners, together with their ability to learn beyond the confines of time and space; and
- build up a stronger IT talented workforce through nurturing students' IT skills and interests in exploring problems and identifying solutions independently.

The smooth and effective implementation of ITE4 relies on the concerted efforts of the stakeholders such as school leaders, teachers, students, parents and the IT sector.

We appreciate your responses to the following:

- How appropriate are the goal of ITE4 and the five proposed actions?
- What are the necessary factors for implementing them? And what would be the barriers?
- What experiences and suggestions would you like to share with us?

THANK YOU

GLOSSARY

Cloud computing

It is a general term that describes different services delivered via the Internet. Cloud computing is used for sharing resources and information and providing web-based applications for users working on different computer devices with a web browser. Furthermore, it can also provide virtual server services for users.

Co-construction

“Co-construction” refers to a family of learning and teaching approaches that puts the focus on the class as a community of learners. Tasks are usually about creating knowledge as well as building criteria for judging that knowledge collectively.

Digital resources depository

It is a collection of contents hosted on the Web through Internet technologies where text, images, audio, videos, and/or other multimedia files are linked / and stored. The “EDB Depository of Curriculum-based Learning and Teaching Resources” is an example.

e-Assessment

e-Assessment is an electronic tool which makes use of IT for presenting assessment activities, recording responses and providing feedback and assessment statistics. It can address the needs of various users including learners, tutors, learning establishments, awarding bodies and regulators.

e-Learning

e-Learning refers to an open and flexible learning mode involving the use of the electronic media, including use of digital resources and communication tools to achieve learning objectives. The essence of e-learning is the use of technology to deliver learning content more effectively and the learning process in e-learning environments is expected to consider three key elements for maximising learning opportunities conducive to 21st century skills development. They include blending formal and informal learning approaches, balancing individualised and collaborative learning to help learners to increase awareness of learning achievement and collecting evidence of improvement.

e-Learning platform

It is an online system or learning management system that provides the technical infrastructure for managing student electronic learning activities. Usually, an e-learning platform includes interactive exercises and tools for generating individual students' test scores. It also includes communication tools for peer-to-peer and student-teacher communications to support collaborative learning.

e-Textbook

An electronic textbook is a comprehensive and self-contained curriculum package with digital print-on demand contents and electronic features (e-features include multimedia like video, audio and animation, and interactive learning, teaching and assessment activities) that are designed to support the implementation of a school subject according to the curriculum guide prepared by the Curriculum Development Council (CDC) in Hong Kong. The package should address all the requirements for learning and teaching in classroom lessons in local school settings and for learning in the home environment.

Mobile learning (m-learning)

M-learning takes place via mobile devices and it is particularly useful for outdoor learning activities like field work and museum visits.

Mobile device

Mobile devices include smartphones, tablet computers and laptop computers, which are portable and have WiFi connection capability for access to the Internet.

Self-directed learning

Broadly speaking, self-directed learning is an umbrella notion related to self-regulated learning, self-learning and independent learning. Each has its features to enhance the learning autonomy of students through building a sense of agency in their learning process. The individual takes the initiative and the responsibility for what occurs and the individual selects, manages, and assesses his or her own learning, which can be pursued at any time, in any place, through any means and at any age. In the context of IT use, self-directed learning generally has four key characteristics:

- Learners' control;
- Learners' self-management;
- Personal autonomy; and
- Tendency of self-learning - the independent pursuit of learning outside formal settings.

List of Abbreviations

ApL	Applied Learning
AQP	Assessment Quality-assurance Platform
BCA	Basic Competency Assessment
BYOD	Bring-your-own-device
CC	Creative Commons
CITG	Composite Information Technology Grant
CoP	Community of Practice
DNA	Deoxyribonucleic Acid
EAST model	Environmental and Spatial Technologies model
EDB	Education Bureau
EMADS	e-Textbook Market Development Scheme
HKEAA	Hong Kong Examinations and Assessment Authority
HKECL	Hong Kong Education City Limited
ICT	Information and Communications Technology
IT	Information Technology
ITE / ITEd	Information Technology in Education
ITE4	Fourth Strategy on Information Technology in Education
KLA	Key Learning Area
KS	Key Stage
LMS	Learning Management System
NAS	New Academic Structure
NGO	Non-government Organisation
NSS	New Senior Secondary
OGCIO	Office of the Government Chief Information Officer
PDP	Professional Development Programme
PISA	Programme for International Student Assessment
PTA	Parent-teacher Association
QEF	Quality Education Fund
SDL	Self-directed Learning
SSO	Single Sign-on
TEKLA	Technology Education Key Learning Area

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