

# **EDUCATION BUREAU'S EFFORTS IN HARNESSING INFORMATION TECHNOLOGY TO FACILITATE LEARNING AND TEACHING**

## **Executive Summary**

1. In line with the global trend of harnessing Information Technology (IT) to facilitate learning and teaching, the Education Bureau (EDB) has implemented various strategies on IT in education and other e-learning initiatives since 1998/99 school year (unless stated otherwise, all years mentioned hereinafter refer to school years). In November 1998, the EDB published the First Strategy on IT in Education (ITE1), and issued the Second and Third Strategies on IT in Education (ITE2 and ITE3) in 2003/04 and 2007/08 respectively. According to the EDB, ITE1 to ITE3 laid a solid foundation in areas such as the provision of basic IT infrastructure and learning resources, and enhancement of teachers' professional capacity and student learning.

2. In 2015/16, the EDB launched the Fourth Strategy on IT in Education (ITE4). According to the EDB, the goal of ITE4 is to unleash the learning power of students to learn to learn and to excel through realising the potential of IT in enhancing interactive learning and teaching experience. The main initiatives under ITE4 include: (a) WiFi-900 Scheme aiming to enable schools to acquire mobile computing devices to tie in with their acquisition of WiFi services covering all classrooms; and (b) a one-off grant to the Hong Kong Education City Limited (HKECL) for enriching e-learning resources. As at 31 March 2018, the actual expenditure on the implementation of ITE4 was \$99.5 million.

3. In addition to ITE1 to ITE4, the EDB has taken other measures to harness IT to facilitate learning and teaching, including: (a) the Composite Information Technology Grant (CITG) provided to all public sector schools (i.e. government schools, aided schools, caput schools and special schools) as a source of ongoing funding to meet their operational needs for IT in education; (b) professional development activities for education professionals to enhance their knowledge and skills to promote e-learning; (c) an education portal operated by the HKECL; (d) some IT related one-off projects funded by the Quality Education Fund to promote quality

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education in schools; (e) a three-year Pilot Scheme on E-Learning in Schools to tap into the changing pedagogical practices and pave the way for wider adoption of e-learning in schools; (f) E-textbook Market Development Scheme to facilitate the development of e-textbooks in line with the local school curricula; and (g) the Scheme for Supporting Schools to Adopt E-textbooks. In financial year 2016-17, the actual expenditure of the recurrent measures in items (a) to (c) was about \$390 million. In 2016/17, the actual expenditure of the recurrent measure in item (d) was about \$50 million. As at 31 March 2018, the actual expenditure of the non-recurrent measures (items (e) to (g)) was about \$150 million.

4. The IT in Education Section of the EDB is responsible for the formulation, implementation and monitoring of e-learning initiatives for enhancing learning and teaching effectiveness in primary and secondary education, including the provision of funding and other professional support to the schools. The Audit Commission (Audit) has recently conducted a review of the EDB's efforts in harnessing IT to facilitate learning and teaching.

### Provision of resources to schools

5. *Need to provide further assistance to schools.* The WiFi-100 Scheme was launched in 2014 as a pioneer measure to provide funding to 100 public sector schools and local schools under Direct Subsidy Scheme (DSS) for setting up the necessary WiFi environment. As an extension to the WiFi-100 Scheme, the WiFi-900 Scheme was launched in 2015 to set up WiFi infrastructure by phases from 2015/16 to 2017/18 for the public sector schools and DSS schools not covered in the WiFi-100 Scheme. The EDB required the schools that intended to participate in the WiFi-900 Scheme to submit an Expression of Interest (EOI) to indicate their tentative e-learning implementation plan and their preference of the time to complete the WiFi enhancement. After reviewing the EOIs submitted by schools, the EDB found that among the 887 schools under the WiFi-900 Scheme, 334 (38%) were considered less ready to implement e-learning in terms of their teachers' readiness and engagement of stakeholders. The EDB provided funding to the 334 schools after obtaining their written confirmations committing to make improvement in these two aspects as the condition for receiving the funding. At the end of 2016/17, 224 (67%) of the 334 schools had enhanced their WiFi infrastructure. Audit examined the results of the annual school survey conducted by the EDB for 2016/17 and noted that: (a) information regarding stakeholders' engagement was not sought in the survey; and (b) of the 224 schools, 47 did not respond to the survey or did not provide information on their readiness in teacher development in their responses, and 88 considered

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themselves less than ready or not ready in the teacher development for integrating e-learning into their school curricula (paras. 2.3, 2.5, 2.7 to 2.9 and 2.11).

6. ***Need to continue to promote the usage of e-textbooks and e-learning resources.*** The key objective of enhancing the WiFi infrastructure for schools under the WiFi-100 Scheme and the WiFi-900 Scheme was to cater to the need of using e-textbooks and e-learning resources in class. The results of the annual school survey conducted for 2016/17 revealed the adoption rates of e-textbooks and e-learning resources among the 310 primary schools and 282 secondary schools that had completed the enhancement of their WiFi infrastructure. Two bases can be used to gauge adoption rates of e-textbooks and e-learning resources: (a) adoption rate on school basis is measured by dividing the number of schools that at least one class in the school had adopted e-textbooks/e-learning resources for any subject by the total number of schools; and (b) usage rate on class-level basis for a subject is measured by dividing the number of class levels in the schools that at least one class in the level had adopted e-textbooks/e-learning resources for the subject by the total number of class levels in the schools. On school basis, the adoption rates in 2016/17 of e-textbooks and e-learning resources in primary schools were 64% and 99.4% respectively, and in secondary schools were 32% and 96.8% respectively. However, on class-level basis, the average usage rates of e-textbooks and e-learning resources across subjects were 24% and 65% respectively in primary schools, and 8% and 66% respectively in secondary schools. The usage rates on class-level basis were lower than the adoption rates on school basis (paras. 2.12 to 2.14).

7. ***Need to further promote the EDB's recommended practice of separating WiFi network from schools' existing networks.*** According to the documents prepared by the consultant for schools' reference, the WiFi network is to be built as a separate network from existing school networks. In case schools opt for the mode of integrating the WiFi network with their existing networks, they may need to take note on the relevant security concerns. In June 2014, the EDB issued letters to 14 participating schools under the WiFi-100 Scheme that planned to integrate the WiFi network with their existing networks reminding them of the potential risk and extra resources that such practices might incur. In January 2016, the EDB added a new recommended practice to its guidelines on IT security in schools recommending schools to build the WiFi network completely separate from schools' existing networks with separate broadband line. Audit examination of implementation progress returns submitted by 50 participating schools under the WiFi-900 Scheme revealed that there were 11 (22%) schools that had integrated the WiFi network with their existing networks. Audit considers that the EDB needs to further promote the

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recommended practice of building the schools' WiFi network completely separate from their existing networks with separate broadband line for better security management. The EDB also needs to remind schools adopting the integrated mode of WiFi networks to address the security concerns on integrating the networks and take appropriate IT security measures accordingly (paras. 2.15, 2.16 and 2.18).

8. *Need to improve the administration of CITG.* In 2004/05, the EDB launched the CITG (see para. 3). Under the CITG, all public sector schools are provided with an annual grant to meet their operational needs for implementing IT in education. In financial year 2016-17, the total amount of CITG provided to 907 schools was \$352 million. Audit noted the following: (a) the EDB has stipulated in its circular to schools and in the CITG website that schools are required to relate the schools' IT budget to the annual School Development Plans. Audit examination of the annual School Development Plans of 40 schools revealed that 6 (15%) schools did not make such a correlation; and (b) some schools did not fully utilise the CITG allocation to develop IT in education. Audit examined the provision of the CITG to schools and the actual expenditure for the periods from financial years 2012-13 to 2016-17 for government schools and school years 2012/13 to 2016/17 for aided schools, and found that 517 (57.7%) of the 896 schools examined had used less than the total amount of CITG allocation in the five years, including 131 (14.6%) schools that had unused funds representing more than 20% of the total allocation in the five years (comprising 107 schools with percentages of unused allocation ranging from more than 20% to 40%; 21 schools with percentages ranging from more than 40% to 60%; and 3 schools with percentages of more than 60%). In September 2017, the EDB launched the Information Technology Staffing Support Grant (ITSSG). The provision of the ITSSG had significantly increased the resources provided to schools for the development of IT in education by 50% (from \$352 million in financial year 2016-17 to \$529 million in financial year 2017-18). This might result in a higher level of unused CITG allocation. The EDB needs to encourage schools to put into effective use the resources allocated to them for the development of IT in education (paras. 2.21, 2.23, 2.24 and 2.26 to 2.28).

### **Development of e-textbooks and procurement of e-learning resources**

9. *Need to step up efforts to facilitate the development of e-textbooks.* In December 2011, the Secretary for Education accepted the recommendations of the Task Force to Review Learning and Teaching Materials that: (a) e-learning resources

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should move beyond their existing supportive role to a more vital role of e-textbooks, to form a complete and independent set of learning and teaching materials developed according to the requirements of the local curricula; and (b) the development of e-textbooks should be promoted in order to introduce competition for the purpose of regulating the distorted textbook market as well as to provide users with greater choice of effective learning and teaching materials. As at April 2018, 479 sets of printed textbooks were available on the Recommended Textbook List covering 46 subject sets, whereas only 49 sets of e-textbooks were available on the Recommended Textbook List for e-textbooks (eRTL) covering 20 subject sets. Audit analysis revealed that the number of e-textbook sets available for users to choose on the eRTL as at April 2018 for each of the four Key Stages, namely Primary 1 to 3, Primary 4 to 6, Secondary 1 to 3, and Secondary 4 to 6, were 13, 14, 22 and 0 respectively. Furthermore, the number of subject sets in which e-textbooks were available on the eRTL for the four Key Stages were 6, 6, 8 and 0 respectively. In particular, no e-textbooks were available on the eRTL for Key Stage 4 (i.e. class levels at Secondary 4 to 6) (paras. 3.2 and 3.6).

10. ***Considerable number of schools used e-textbooks not on eRTL.*** The eRTL has been published by the EDB since 2014/15. According to the EDB, the quality of e-textbooks submitted for review would be subject to the quality assurance criteria derived from the experience in the vetting of printed textbooks. Audit analysed the schools that adopted e-textbooks for the three major subjects (i.e. Chinese Language, English Language and Mathematics) and found that the percentages of primary schools and secondary schools that adopted e-textbooks not on the eRTL ranged from 28% to 34% and 45% to 48% respectively (paras. 3.8 and 3.9).

11. ***Need to improve the e-learning resources procured under the e-Resources Acquisition Project.*** Of the \$105 million earmarked for the implementation of ITE4, \$10 million was granted to the HKECL for the e-Resource Acquisition Project (eREAP). The HKECL was responsible to source suitable e-learning resources for use by schools. Of the 128 e-learning resources proposals received, 8 passed the screening and were made available for schools' adoption in eREAP. Audit noted the following: (a) a total of 205 schools participated in the first year of eREAP. Of these 205 schools, 46 (22%) did not participate in the second year. The main reasons for the schools' withdrawal from eREAP were the suitability of the e-learning resources to the schools and the schools' different priorities in learning and teaching; and (b) while the e-learning resources procured under eREAP covered various subjects including English Language, Mathematics and Liberal Studies, they did not cover Chinese Language. In December 2017, the HKECL

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conducted a survey to collect the views from 66 participating schools of eREAP. According to the survey results, about 39% of the teachers from the 66 schools suggested that Chinese Language should be covered in eREAP and it was one of the three subjects suggested by most teachers (paras. 3.15, 3.16 and 3.18 to 3.22).

12. *Need to improve the development and usage of Online Integration Services Platform for e-textbooks and e-learning resources.* In March 2014, the EDB and the HKECL entered into agreement for the development of the Online Integration Services Platform (OISP). The OISP included two components, namely the Single Sign On (SSO) for providing a one-stop account management for students, teachers and content providers of e-textbooks and e-learning resources, and EdBookshelf for serving as an exchange platform for delivery of e-textbooks and e-learning resources from content providers to students' network storage, and facilitating exchange of learning data between content providers and schools. Audit noted the following: (a) in the four-year period from 2014/15 to 2017/18, the total number of teacher members and student members of the HKECL as at the end of each school year ranged from 628,724 to 666,957. During the same period, the number of members using the SSO and EdBookshelf each year increased from 17,988 to 60,294 and 3,148 to 17,080 respectively. Notwithstanding the increase, there is still room to encourage more members to use the SSO and EdBookshelf; (b) as at 30 June 2018, 1,221 e-books were available at EdBookshelf. However, none of the e-books were e-textbooks on the eRTL. There is a need to enhance usage of EdBookshelf by e-textbook publishers; and (c) as at 30 June 2018, of the 1,221 e-books uploaded to EdBookshelf by 38 content providers, only eight e-books developed by one content provider had the function of retrieving learning data from them enabled. According to the EDB, designing e-books with learning data analysis is a more advanced design and is more effective to facilitate learning (paras. 3.25, 3.27, 3.28 and 3.30).

### Professional development of school leaders and teachers

13. *Need to improve the award rate of certificate of some commissioned courses.* The IT in Education Section of the EDB organises professional development programmes to better equip school leaders and teachers with the necessary knowledge and skills on the latest practice of e-learning. Courses are provided by the EDB or commissioned to service providers. The EDB entered into separate contracts with the service providers for the provision of each commissioned course. A commissioned course may run a number of times (each time is known as an event). The service providers would issue a certificate to each participant who achieved full attendance and submitted the course-related work within two weeks after the last session of the

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event. The certificate award rate is the percentage of participants who fulfil both required conditions. Audit noted that the rates of some events were not high. For instance, in many events the rate was not higher than 70% (i.e. not more than 70% of participants having achieved full attendance and submitted course-related work before deadline). The percentage of events awarding the certificate to more than 70% of the participants, had decreased from 74.0% (57 of 77 events) in 2015/16 to 61.6% (45 of 73 events) in 2016/17 (paras. 4.2, 4.4, 4.5 and 4.7).

### Monitoring of implementation of IT in education

14. *Annual school survey on progress of implementation of IT in education.* Since 2015/16, the EDB has conducted annual school surveys covering public sector schools and DSS schools. The annual school surveys collect information from schools on their progress of implementing IT in education covering aspects such as schools' IT environment and infrastructure, and the use of e-resources for learning (para. 5.2). Audit noted that:

- (a) *Need to follow up with schools that did not respond to the annual school surveys.* Of the 984 schools covered in the survey for 2016/17, 715 (72.7%) schools replied while 269 (27.3%) did not respond to the survey. Of the 269 schools which did not respond to the annual school survey for 2016/17, 187 (69.5%) also did not respond to or were not covered by the preceding survey for 2015/16. Omitting schools that decided not to respond to the survey may have a bearing on the survey results (para. 5.4); and
- (b) *Some schools were behind their targets in implementing e-learning.* Of the 715 schools that responded to the survey for 2016/17, 56 (7.8%) indicated that their progresses on implementing e-learning were behind the targets set in their three-year School Development Plans. The EDB had not ascertained why their progresses were behind targets and explored whether these schools would need any assistance from the EDB to help them catch up with the progresses (para. 5.5).

### Audit recommendations

15. **Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has recommended that the Secretary for Education should:**

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### *Provision of resources to schools*

- (a) **consider measures to keep track of how schools fulfil the commitment they made in seeking funding for enhancing their WiFi infrastructure and, where necessary, provide assistance to them to improve their readiness in implementing e-learning (para. 2.19(a));**
- (b) **understand the concerns and considerations of schools in adopting e-textbooks and take measures to encourage schools to extend their usage of e-textbooks where there are merits in doing so (para. 2.19(b));**
- (c) **continue the EDB's efforts in promoting the usage of e-learning resources (para. 2.19(c));**
- (d) **further promote the recommended practice of building the schools' WiFi network completely separate from the existing networks with separate broadband line for better security management (para. 2.19(d));**
- (e) **remind schools adopting the integrated mode of WiFi networks to address the security concerns on integrating the networks and take appropriate IT security measures accordingly (para. 2.19(e));**
- (f) **take measures to encourage schools to relate the schools' IT budgets to the annual School Development Plans with a view to enhancing the accountability and transparency of the schools' use of the CITG (para. 2.29(a));**
- (g) **take measures to encourage schools, in particular schools with significant level of unused CITG funding, to monitor the utilisation of the CITG and put into effective use the resources allocated to them for the development of IT in education (para. 2.29(b));**

### *Development of e-textbooks and procurement of e-learning resources*

- (h) **in consultation with the Steering Committee on Strategic Development of Information Technology in Education, determine the way forward and consider ways to facilitate the future development of e-textbooks (para. 3.13(a));**



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- (i) continue to monitor the development of the eRTL (para. 3.13(b));
- (j) promote the eRTL as a quality vetting and assurance mechanism for e-textbooks among e-textbook developers and schools and encourage e-textbook developers to submit e-textbooks for review (para. 3.13(c) and (d));
- (k) in collaboration with the HKECL, consolidate the experience gained from the implementation of eREAP with a view to improving eREAP and determining the way forward for e-learning resources acquisition (para. 3.23(a));
- (l) explore ways to source more quality e-learning resources in the market, in particular for Chinese Language (para. 3.23(b));
- (m) urge the HKECL to further promote the usage of the SSO and EdBookshelf among HKECL members (para. 3.31(a));
- (n) urge the HKECL to keep in view the challenges faced by and considerations of e-textbook developers and take measures to address their concerns where necessary with a view to enhancing the usage of EdBookshelf by e-textbook publishers (para. 3.31(b));
- (o) urge the HKECL to encourage content providers to enable the function of EdBookshelf to retrieve data from their e-books with a view to facilitating exchange of learning data between content providers and schools (para. 3.31(c));

### *Professional development of school leaders and teachers*

- (p) take measures to improve the certificate award rate of the commissioned courses (para. 4.10(a));

### *Monitoring of implementation of IT in education*

- (q) step up efforts to follow up with schools that did not respond to the annual school survey as far as practicable (para. 5.7(a)); and

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- (r) **keep in view schools which considered their progresses of implementing e-learning behind the targets set in their School Development Plans, and proactively offer timely advice and assistance to them where necessary (para. 5.7(b)).**

### **Response from the Government**

16. The Government fully appreciates Audit's efforts in conducting the review and making recommendations to improve the implementation of IT in education and generally agrees with the audit recommendations.